



ISSAAS 2015 & 118th JSTA International Joint Conference

Tokyo University of Agriculture
November 7-9, 2015

Agricultural Sciences for Sustainable Development

2014 Photo

International Society for Southeast Asian Agricultural Sciences (ISSAAS)

Japanese Society for Tropical Agriculture (JSTA)

Society for Agricultural Education-Research Develolpment Abroad (SAEDA)

Tokyo University of Agriculure(TUA)

科研費 KAKENHI JAPAN SOCIETY FOR PROMOTION OF SCIENCE (KAKENHI)




ISSAAS 2015

International Congress and General Meeting

(Joint Conference: 118th Annual Meeting of the Japanese Society for Tropical Agriculture)

Agricultural Sciences for Sustainable Development

The International Society for Southeast Asian Agricultural Sciences was established to strengthen cooperation among agricultural scientists in Asia, such as Japan, Thailand, Indonesia, Philippines, Vietnam and Malaysia. This year, the **ISSAAS International Congress 2015** will be held at Tokyo University of Agriculture (Setagaya Campus, Tokyo) in conjunction with the 118th Annual Meeting of the Japanese Society for Tropical Agriculture (JSTA), and in cooperation with Tokyo University of Agriculture (Tokyo NODAI) and Society for Agricultural Education Research Development Abroad (SAEDA).

Venue Yokoi Hall & Building 1, Tokyo University of Agriculture (Setagaya Campus)

SCHEDULE

7 November (Sat)

8:00 Registration (Yokoi Hall)
9:00 General Assembly (Yokoi Hall)
Awarding Ceremony
ISSAAS Matsuda Award Prof. Herry SUHARDIYANTO (Rector, Bogor Agricultural University/ Indonesian)
Young Scientist Award Dr. Nina Nocon-SHIMOGUCHI (Part-time Lecturer, Tokyo University of Agriculture/ Filipino)
10:00 Keynote Lectures (Yokoi Hall) (Open to General Public. Limited seats available)
1) Dr. Mario T. TABUCANON (Visiting Professor, Institute for the Advanced Study of Sustainability, United Nations University)
"Sustainability Science: Bridging Agricultural Sciences and Sustainable Development"
2) Dr. Eiji NAWATA (Professor, Graduate School of Agriculture, Kyoto University)
"Agricultural Sciences for Sustainable Development - Recent Situation of Agricultural Production in Southeast Asia and Future Development"
12:00 Lunch (Room 431 and 432)
13:00 Plenary Session (Lectures from 6 Participating Countries)
Indonesia Dr. Hermanto SIREGAR (Bogor Agricultural University)
"Reducing Economic Inequality through Agrarian Transformation: A Role of Rural Saving and Investment"
Japan Dr. Tadashi BABA (Tokyo University of Agriculture)
"Action Research to Promote the Sustainable Development of Local Agriculture in Southeast Asia"
Malaysia Dr. Siva BALASUNDRAM (Universiti Putra Malaysia)
"Towards a Greener Agriculture"
Philippines Dr. Fernando SANCHEZ, Jr (University of the Philippines Los Banos)
"An Overview of the Challenges Faced by Philippines Agriculture and Strategies towards Sustainable Development"
Thailand Dr. Seksom ATTAMANGKUNE (Kasetsart University)
"Transforming Agricultural Education System for Sustainable Development"
Vietnam Dr. Tran Duc VIEN (Vietnam National University of Agriculture)
"Wastewater Reuse: Challenges and Perspectives for Sustainable Agriculture in Vietnam"
15:00 Break (Visit Poster Area and Company Booth) (Room 431 and 432)
15:30 Scientific Meeting (7 Simultaneous Sessions and Poster Session: About 250 Oral and Poster Presentations)
18:00 Opening Party (Seikyo Green Restaurant)

8 November (Sun)

9:00 Scientific Meeting and Visit Poster Area and Company Booth
12:30 Lunch (Room 431 and 432)
13:30 Scientific Meeting and Visit Poster Area and Company Booth
15:00 Break (Visit Poster Area and Company Booth) (Room 431 and 432)
15:30 Scientific Meeting
18:00 Closing "SAYONARA" Party (Seikyo Green Restaurant)

9 November (Mon): Congress Tour

Tokyo NODAI students are welcome to attend the Keynote Lectures, Plenary Session, Scientific Meeting and Poster Session for FREE. Interested individuals may participate by paying the membership fee (Full member: 10,000 yen; Student member: 5,000 yen) and congress registration fee of 15,000 yen(Student : 5,000 yen).
For more details, kindly contact the ISSAAS Congress Secretariat at issaas15@nodai.ac.jp.

Welcome Messages

President of Tokyo University of Agriculture
Professor Katsumi Takano

Chair of the Organizing Committee for ISSAAS 2015
Professor Keiko T. Natsuaki

Message to the ISSAAS International Congress 2015

Tokyo University of Agriculture (Tokyo NODAI) is deeply grateful for the opportunity to host this year's International Society for Southeast Asian Agricultural Sciences (ISSAAS) International Congress at our Setagaya Campus, and I offer my congratulations on behalf of the entire University community.

Founded in 1994, ISSAAS marked its 21st anniversary this year. Last year's conference enjoyed a huge rate of attendance due in part to being the 20th anniversary commemorative congress, but participation this year is even higher, indicating the magnitude of attendees' expectations.

The growth of the Society in recent years is the result of the hard work of many past Presidents, officers and members, and we are deeply grateful for their contributions.

ISSAAS and the Japanese Society for Tropical Agriculture (JSTA) were established with the goal of addressing the variety of agricultural science-based problems that affect agriculture in Southeast Asia, devising solutions and contributing to the development of the region. These societies conduct their activities mainly in Indonesia, Malaysia, the Philippines, Thailand, Vietnam and Japan, and the results have earned high praise. In order to enhance efforts to share the results of our research with the world, this year's ISSAAS International Congress is a joint conference held in collaboration with JSTA.

The theme of this year's conference is ***Agricultural Sciences for Sustainable Development,*** and the results of more than 250 research projects will be presented in the fields of Plant Production and Environmental Agriculture, Agricultural Chemistry, Aquatic Science, Forest and Forest Products Science, Agro-Engineering, Animal Life Science, Agricultural Science in Society and Economy, and Boundary Agriculture. I deeply hope that this meeting will lead to profound exchanges among participants as well as broadening and strengthening educational research networks.

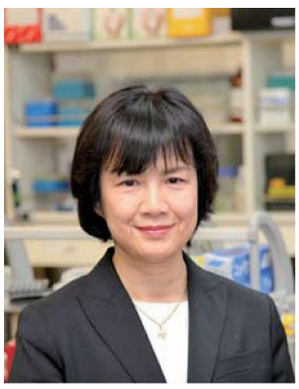
Tokyo NODAI was founded in 1891 as Japan's first private agricultural university, and we will celebrate our 125th anniversary in 2016. We currently have three campuses in Setagaya, Atsugi, and Okhotsk, with two graduate schools, six undergraduate faculties, 22 departments, 700 faculty members, 13,000 students and 162,000 alumni, making us Japan's largest agricultural university.

Tokyo NODAI works to provide the global society with human resources that can take on the challenges of the future by promoting world-class, state-of-the-art research and practical education fostering an "agricultural spirit" with a respect for the value of life. The University seeks to further the agricultural and life sciences and build an ethical (environmental conservation, social contribution, etc.) society that supports "life" in all its forms.

I sincerely hope that you will take this conference as an opportunity to develop an even deeper understanding of our University and that ISSAAS will continue to evolve.

Katsumi TAKANO
President, Tokyo University of Agriculture
President, ISSAAS

Welcome Message



Dear all participants of a joint conference of the International Society for Southeast Asian Agricultural Sciences (ISSAAS) and the Japanese Society for Tropical Agriculture (JSTA) in collaboration with Society for Agricultural Education Research Development Abroad (SAEDA) and Tokyo University of Agriculture (Tokyo NODAI), it is my great pleasure to welcome you to Tokyo, Japan. Since the last conference of ISSAAS in 2014 which we celebrated the 20th anniversary of ISSAAS with over 200 participants from various countries in Southeast Asia and beyond, ISSAAS members once again have this wonderful opportunity to gather and join with JSTA under this year's theme **"Agricultural Sciences for Sustainable Development"**.

Sustainability in development is always a key issue in agricultural sciences in the world particularly in developing Asian countries. The concept of sustainability and the technologies for sustainable agriculture are, however, various, changing and dynamic in nature even though what we really wish to realize is absolutely the same. In this regard, our role in agricultural sciences is highly significant and thus we need to keep learning and improving together. We are also responsible to transfer our beautiful and productive planet to the next generation.

This joint conference will offer our participants to see, interact and learn from diversified people with full amount of experience or with full of fresh and young ideas, from various countries, and in different fields of sciences. In keynote lectures, plenary lectures, scientific presentations, excursion and parties, you will gain lots of discoveries and be able to give inspirations to others. You will return home with stronger expectation to the next ISSAAS and JSTA conferences and this is again the promise of the organizing committee.

Keiko T. NATSUAKI
Chair, Organizing Committee for ISSAAS 2015, Tokyo, Japan
Vice-President to Japan Chapter, ISSAAS
Vice-president, Tokyo University of Agriculture

Program at a Glance

Date and Time	Nov. 7 (09:00～10:00): General Assembly at **Yokoi Hall**						
	Nov. 7 (10:00～12:00): Keynote Lectures at **Yokoi Hall**						
	Nov. 7 (13:00～15:00): Plenary session at **Room 331**						
	Room no. 311	**Room no. 312**	**Room no. 313**	**Room no. 411**	**Room no. 412**	**Room no. 413**	**Room no. 321**
Nov. 7 (Sat) 15:30～17:00	Plant Production (A01 ～A04) Dr. IWAI Chuleenmas Boonthai	Plant Production (A30 ～A35) ~~Dr. I WA YAN Susila~~ K. Takahata & B. Pachakkil	Plant Production (A60 ～A65) Dr. Kim Ok-Kyung	Social Sciences (C01～C06) Dr. Yoshihiko Nishimura	Social Sciences (C31～C36) Dr. Rie MIYAURA	Animal Life Science (E01～E06) Dr. Asep Sudarman	Boundary Agriculture (G01～G06) Dr. Hirokazu Higuchi
Nov. 8 (Sun) 09:00～10:30	Plant Production (A06～A11) Dr. Atsushi Sanada	Plant Production (A36 ～A41) Dr. Siva Balansundram	Plant Production (A66 ～A71) Dr. Keiichi Motohashi	Social Sciences (C07～C12) Dr. Evalour Aspuria	Social Sciences (C37～C42) Dr. Yusman Syaukat	Animal Life Science (E07～E12) Dr. Pequena Teresita	Agricultural Chemistry (H01～H06) Dr. Dadang Dadang
Nov. 8 (Sun) 11:00～12:30	Plant Production (A12 ～A17) Dr. Hidehiko Kikuno	Plant Production (A42 ～A47) Dr. Kenji Irie	Plant Production (A72 ～A77) Dr. WIYONO, Suryo	Social Sciences (C13～C18) Dr. Nina SHIMOGUCHI	Social Sciences (C43～C45) Forest Science (D01, D02) Dr. Takayoshi SATO	Animal Life Science (E13～E18) Dr. Orden Edgar	Agricultural Chemistry (H07～H12) Dr. Susan Calumpang
Nov. 8 (Sun) 13:30～15:00	Plant Production (A18 ～A23) Dr. Hide Omae	Plant Production (A48 ～A53) Dr. Babil Pachakkil	Plant Production (A78～A83) Dr. Fernando Sanchez, Jr.	Social Sciences (C19～C24) Dr. CATELO, Salvador		Animal Life Science (E19～E24) Dr. Soisuwan Keatisak	Satellite session (I01 ～I05) Dr. Tran Duc Vien
Nov. 8 (Sun) 15:30～17:00	Plant Production (A24 ～A29) Dr. Mami IRIE	Plant Production (A54 ～A59) Dr. Abdul Shukor Juraimai	Aquatic science (B01～B06) Dr. Seksom Attamangkune	Social Sciences (C25～C30) Dr. Mazlan Norida		Agro-engineering (F01～F06) Dr. Machito MIHARA	Satellite session (I06 ～I09) Dr. Nguyen Thi Bich Thuy
Nov. 7 (13:00 ～ 17:00) Nov. 8 (09:00 ～17:00)	Poster sessions at Rooms **421, 422, 423, 424, 425** and **426**						

ISSAAS Award Winners

ISSAAS Matsuda Award

Prof. Herry SUHARDIYANTO

Bogor Agricultural University (Institut Pertanian Bogor or IPB)

Indonesia

ISSAAS Young Scientist Award

Dr. Nina NOCON-SHIMOGUCHI

Tokyo University of Agriculture (Tokyo NODAI)

Filipina Member, ISSAAS Japan Chapter

Keynote Lectures

Venue: Yokoi Hall
（Open to General Public. Limited seats available）

1) Dr. Mario T. TABUCANON

Visiting Professor, Institute for the Advanced Study of Sustainability, United Nations University

“Sustainability Science: Bridging Agricultural Sciences and Sustainable Development”

2) Dr. Eiji NAWATA

Professor, Graduate School of Agriculture, Kyoto University

“Agricultural Sciences for Sustainable Development - Recent Situation of Agricultural Production in Southeast Asia and Future Development”

Sustainability Science: Bridging Agricultural Sciences and Sustainable Development

Mario T. TABUCANON
Visiting Professor, United Nations University
Institute for the Advanced Study of Sustainability;
Emeritus Professor, Asian Institute of Technology

The Ubuntu Declaration[1] on Education, Science and Technology for Sustainable Development called for the strengthening of science and technology education for sustainable development. It underscored the belief that 'science is all science', whether natural, social or human sciences. All science, when utilized for the common good, constitutes collectively what is known as 'sustainability science'. Simply put, sustainability science ties the relevant scientific disciplines in an interdisciplinary and cross-cutting fashion, agricultural sciences among them, to serve a common global aspiration known as 'sustainable development'.

At the end of the UN DESD[2], one of the important findings of UNESCO[3] was that the education and development agendas have been converging, but major work remains to ensure full policy coherence between the sectors and across relevant subsectors. To bridge the gap between education and research on one hand, and sustainable development on the other, relevant international platforms may be invoked to facilitate and provide inspirations to sustainability processes, such as the Higher Education Sustainability Initiative (HESI)[4] and Future Earth[5].

The Age of Sustainable Development aspires for economic development which is socially inclusive and environmentally sustainable. It entails transformation of education and research to be interdisciplinary and holistic, values-driven, focusing on critical thinking and problem solving, multi-methodological, participatory decision-making, and locally relevant to suit local conditions. Sustainable agriculture is about embracing these key characteristics along the pathways to sustainable development, and fostering sustainable practices aligned with promoting low-carbon economy, green economy, and sustainable consumption and production.

Through agricultural sciences, sustainable agriculture creates an economy that attains food security while preserving the natural environment and ensuring minimal output of greenhouse gas emissions into the biosphere. The relevant sciences must be able to create better quality growth in terms of productivity, ecological quality and social quality, as well as provide inputs that result in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. This would require scientific and technological developments that decouple economic growth and social well-being with environmental impact. Sustainable agriculture means having a vision of change – sustainable production and consumption – that cultivates the mind set of living within limits, shaping sustainable societies, and creating systems that lead to sustainable behavior.

The interface of science and policy is important in decision making for sustainable development. Policymaking must be evidence-based and rational that requires understanding the problem, establishing sustainability criteria, analyzing and synthesizing the constituent sub-problems. Agricultural sciences are expected to influence policymaking from agenda setting to formulation to implementation. The 2030 development agenda and the Sustainable Development Goals (SDGs) have set new aspirations for all. All sectors, all stakeholders, all science need to work in harmony to achieve the goals and targets set forth by SDGs and everyone is expected to contribute to creating sustainable societies.

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[1] *At the 2002 World Summit on Sustainable Development in Johannesburg, South Africa 11 leading educational and scientific organizations, known as the Ubuntu Alliance, under the leadership of UNU, signed the Ubuntu Declaration, with goals to strengthen collaboration between science and technology researchers and educators to better integrate the sectors for sustainable development.*

[2] *UN Decade of Education for Sustainable Development 2005-2014*

[3] *In "Shaping the Future We Want", UN DESD Final Report, UNESCO, 2014*

[4] *Launched at Rio+20 UN Conference on Sustainable Development which encourages research on sustainable development issues to improve scientific understand*ing

[5] *Launched at Rio+20 UNCSD as a new global platform for sustainability research*

Agricultural Sciences for Sustainable Development - Recent Situation of Agricultural Production in Southeast Asia and Future Development

Eiji NAWATA
Graduate School of Agriculture, Kyoto University

Recently, agricultural production of Southeast Asia has been remarkably increased. The production of major crops like rice, maize, sugarcane, cassava, leguminous crops and horticultural crops have been largely increased, whereas the increase in production area of each crop are somewhat limited, indicating the improvement of the productivity. Agricultural sciences have contributed to the improvement of the productivity in various ways, such as breeding new varieties for yield increase, disease and pest resistance, and environmental stress tolerance, improving cultivation managements like appropriate fertilizer application and disease and pest controls, developing sophisticated farming and cropping systems using modernized agricultural technologies, establishing irrigation and drainage systems, etc. Still, we have many challenges for further development. In Southeast Asia, agriculture is rapidly being commercialized. Until recently, agriculture had been generally practiced for self-sufficiency. Most farmers in the area had produced self-sufficient crops for their own foods, but now most of them are cultivating commercial crops. In line with this trend, cultivation is modernized and more intensified, and major cropping systems are based on mono-cropping of major crops, not on traditional mixed cropping of multiple crops. The modernization and intensification of agriculture sometimes cause the increase in environmental load, as observed broadly in temperate areas, such as pesticide residues in the environment and water contamination. The improvement of agricultural productivity must be accomplished with low environmental impact. As agriculture is modernized and intensified, traditional agricultural systems, some of which had been maintained on sustainable basis for many years, are disappearing and replaced with more modernized agricultural systems. The representative example is shifting cultivation. In mountainous area of Mainland Southeast Asia, shifting cultivation has been practiced since long time ago, but recently their agro-ecological basis is being lost due to various reasons and rapidly changing into new systems. Vast area of former shifting cultivation fields are being converted to permanent upland fields on steep mountain slopes. This may cause the increase in environmental loads and the establishment of new systems, productive and sustainable, are required. Another factors that should be considered are influences of global warming. Rainfall is originally unstable everywhere on the earth, but in recent years it has been more unstable. This may induce instability of agricultural production and many areas in Southeast Asia have experienced damages by this phenomenon in these several years. Studies to cope with this problem are being undertaken, but influences of temperature increase on agricultural production have not been studied yet. In the tropics, the temperature is naturally high and slight increase of temperature may not be influential on agricultural production. This is wrong and sometimes even slight increase in temperature may affect plant growth conspicuously. Appropriate varieties already established may have to be changed. Lowland crops can be cultivated in highland area and may promote changes in crops and cropping systems there. Many subtropical and temperate crops cultivated in highland area may no longer be able to be produced at the present sites. For solving these challenging issues, agricultural scientists must work hard together with policy makers, agricultural extension workers and farmers.

Plenary Session

Lectures from 6 Participation Countries

Venue: Room 331

Indonesia:
Dr. Hermanto SIREGAR (Bogor Agricultural University)
"Reducing Economic Inequality through Agrarian Transformation: A Role of Rural Saving and Investment"

Japan:
Dr. Tadashi BABA (Tokyo University of Agriculture)
"Action Research to Promote the Sustainable Development of Local Agriculture in Southeast Asia"

Malaysia:
Dr. Siva BALASUNDRAM (Universiti Putra Malaysia)
"Towards a Greener Agriculture"

Philippines:
Dr. Fernando SANCHEZ, Jr (University of the Philippines Los Banos)
"An Overview of the Challenges Faced by Philippines Agriculture and Strategies towards Sustainable Development"

Thailand:
Dr. Seksom ATTAMANGKUNE (Kasetsart University)
"Transforming Agricultural Education System for Sustainable Development"

Vietnam:
Dr. Tran Duc VIEN (Vietnam National University of Agriculture)
"Wastewater Reuse: Challenges and Perspectives for Sustainable Agriculture in Vietnam"

Reducing Economic Inequality through Agrarian Transformation: A Role of Rural Saving and Investment

Hermanto Siregar[1)], Siti Jahroh[2)], Dicky Firmansyah[3)], Indra[3)], and Heni Hasanah[4)]

[1)] Professor of Economics, Department of Economics, Bogor Agricultural University (IPB), Indonesia
[2)] Lecturer, Department of Agribusiness, IPB, Indonesia
[3)] Scholars, Brighten Institute, Indonesia
[4)] Lecturer, Department of Economics, IPB, Indonesia

The agricultural sector in Indonesia recently employs about 35 percent of the workforce, while the GDP share of the sector is only around 14 percent. This indicates relatively low level of farmers' economic wellbeing as compared to other sectors', which could be corrected by inducing agrarian transformation. One of the critical problems in conducting agrarian transformation is scarcities in saving and investment in rural area. This problem limits not only the ability of the agricultural sector to grow optimally but also constrains improvement of non-farming and off-farming activities in rural area, which make agricultural employment stuck and accumulated badly within the sector. Therefore studying agricultural/rural saving and investment and their relation to support of agrarian transformation is very important. This paper includes analysis on factors affecting agricultural saving and investment, utilizing household data from three Indonesia's provinces that have played predominant role with respect to agricultural sector. It is found from the regression analysis that the farm level investment is positively affected by operated land area and farm income. Furthermore, households with more non-agricultural income tend to have higher savings and productive investment that potentially can be used for financing non-farm and off-farm activities, which in turn capable of providing job opportunities to be filled by existing rural workforce who are working under their capacity and hence inducing agrarian transformation to run. This transformation would push further rural development and signify attempts to reduce economic inequality. As such, it is suggested that government should provide incentives for farmers as well as non-farmers to invest more in agroindustry in rural area.

Keywords: agrarian transformation, economic inequality, rural saving and investment.

Action Research to Promote the Sustainable Development of Local Agriculture in Southeast Asia

Tadashi Baba

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Agricultural sustainability in Southeast Asia is in crisis due to severe competition with non-agricultural sectors for limited land, water, labor, and capital resources, as a result of rapid industrialization. Agricultural universities aim to conduct education, research, and extension activities that lead to the sustainable development of agriculture and rural villages. We are thus proposing a new research project to be jointly formulated and implemented by Tokyo University of Agriculture and its partner universities, Bogor Agricultural University, University of the Philippines at Los Banos, and University Putra Malaysia, which are equally responsible for these social contributions through the abovementioned activities. This project will aim to develop methods for increasing indigenous productivity in agricultural and rural settings and will demonstrate their effectiveness and extend them into as many rural areas as possible.

Indonesia:

Agriculture still plays an important role in the Indonesian economy, although rapid industrialization has affected the agricultural sector owing to limited natural resources. Petir is a village in West Java, Indonesia, which is located close to the cities of Bogor and Jakarta and has thus been impacted by rapid industrialization and urbanization. In our pursuit of the sustainable development of regional agriculture, we set out to develop a more diverse agricultural system that uses an optimal combination of crops, livestock, and fish to maximize the income of small-scale farms. We first investigated the potential for utilizing botanical resources in agroecosystems and developed a new feed for small ruminants made from cassava or sweet potato shoots. This is the first step toward achieving self-sustainable meat production. We then developed a new system for the efficient use of nitrogen using fishpond sediment and water. These have previously been shown to be a good source of nitrogen fertilizer thereby allowing improved nutrient recycling and efficient energy flow in the agroecosystems with fewer external inputs. Continued research will be conducted to assess the socio-economic impacts of this proposed integrated farming system.

The Philippines:

The Philippines is the only commercial supplier of calamansi in the world. This citrus fruit is native to the Philippines and is one of the most commercially important citrus fruit crops in the country. Because of the inherent perishability of this fruit, postharvest handling has always been a problem. This project aimed to determine the causes of postharvest losses in the supply chain of calamansi in a real agricultural setting. Investigation of the quality of calamansi produced in Nueva Ecija, the Philippines, showed that 80% of the fruits were marketable for sale as fresh produce. Laboratory experiments indicated that modified atmosphere packaging and hot water treatment could be used as technological innovations during the postharvest process to reduce losses of fresh produce. We also found that half of the fruits that were rejected as fresh produce could still be utilized for juice processing. These were the overripe fruits that were not damaged, and contained the highest levels of total soluble solid and ascorbic acid. However, we found that numerous improvements were required to comply with Good Manufacturing Practices (GMP) for juice processing; therefore, we initiated a training program for calamansi operators to ensure that a GMP-compliant product was produced.

Malaysia:

Malaysia is the second largest producer and exporter of palm oil in the world. Studies are currently investigating the potential applications of fiber residues that are produced as a by-product of palm oil extraction. It has been shown that these are important resources for the improvement of physical, chemical, and biological properties of soil and, if residues are managed properly, it can facilitate sustainable crop production. Mulching with palm oil residue can be used to conserve soil moisture, whereas the incorporation of residue in nursery soils can improve the physical properties of the soil. Experiments have shown that considerable potential exists for the use of palm oil fiber residue as a planting medium for vegetables and ornamental plants; however, further research is required on the use of the fiber for more effectively enhancing soil fertility and nutrient uptake.

Keywords: Farmers' organization, Local special products, Technology diffusion, Farm income increase

Towards a Greener Agriculture

SK Balasundram[1)*], MHA Husni[2)] and AS Juraimi[3)]

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[2)]Department of Land Management, Faculty of Agriculture, Universiti Putra Malaysia, 43400 Serdang, Selangor, MALAYSIA
[3)]Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia, 43400 Serdang, Selangor, MALAYSIA
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Current estimates indicate that the agricultural sector worldwide account for about 14 % of the annual global Green House Gas (GHG) emissions. With dramatic increases in global food demand, this figure could increase by up to 40 % in 2030. On one hand, developing countries contribute nearly half of the total GHG emissions. On the other hand, climate change is steadily depressing crop yields, pushing food prices up and endangering food security.

Numerous policy and scientific reports indicate that if better technologies and management practices are evolved and put into use, the agricultural sector can offer a huge potential to reduce GHG load in a cost-effective manner. This approach in fact, is sustainable agriculture. Sustainability has been given due consideration because in Asian countries intensive land use is accompanied by problems such as unplanned exploitation of the natural soil and water resources. The skyrocketing costs of energy and agricultural inputs have reduced profitability, which has severely damaged the environment. Data shows agricultural acreage is being increased by 13 % in the last 30 years at the expense of lowland forests and their rich biodiversity.

This necessitates proper assessment of the constraints and potentials of natural resources by examining policies of respective governments, and appropriateness of agricultural production technologies. The ideal technology should be efficient, practical, cost effective and pollution-free. Importantly, the sustainability factor should override at all facets of technology development and implementation.

Candidates for green agricultural technology include: i) Plant Gene Technology, ii) Information and Communication Technology (ICT), iii) Pest Control Technology, iv) Rainwater Harvesting and Storage Technology, v) Land and Crop Management Technology, vi) Crop Technology,
vii) Biomass Technology and viii) Precision Farming Technology. In Malaysia, several agricultural practices to mitigate climate change are already in place. For example, oil palm plantations, which occupy more than 5 million hectares of cultivated land, can effectively sequester large amounts of carbon dioxide (a GHG) from the environment. In oil palm cultivation, it is standard operating procedure to establish leguminous cover crops (also known as green manure) at the start of the cropping cycle. These cover crops effectively control soil erosion, which is very rampant due to high rainfall. Additionally, zero burning, a widely accepted means of land clearing in oil palm, significantly reduces carbon dioxide emission. There is also an increasing commitment to venture into crops that can be processed into biomass energy. One such crop is *Jatropha curcas*, a perennial shrub which can be grown under marginal soil conditions. *Jatropha curcas* is an advantageous energy crop because its oil is non-edible. Nevertheless, much effort is required to improve its agronomic operations (e.g. mechanized harvesting instead of manual harvesting), and increase its oil extraction efficiency.

Climate change will have dramatic consequences for agriculture. However, substantial uncertainty remains about where the effects will be greatest. Adopting green agricultural technologies will substantially increase agricultural productivity, regardless of climate change. But adopting better 'temperature-adapted' crop varieties could completely mitigate the climate change effects that result from global warming. In order to meet the twin challenges of food security and climate change, the world must find ways to grow more food and to do so using greener agricultural technologies.

An Overview of the Challenges Faced by Philippine Agriculture and Strategies towards Sustainable Development

Fernando C. Sanchez, Jr.

Crop Production Management Division, Crop Science Cluster, College of Agriculture and
Chancellor, University of the Philippines Los Baños
College, Laguna 4031, PHILIPPINES

Agriculture is still a key component of the Philippine economy and agricultural development remains having a significant role in the advancement of rural communities. Although agriculture, fishery and forestry represent just about 20 percent of the economy's domestic output (GDP), about 37 percent of jobs still depend on agriculture. If outputs related to agro-processing and agricultural inputs, manufacturing and trading (i.e. agribusiness sectors) as well as basic agricultural production are considered agriculture contributes to the economy, about 40 percent of GDP and two-thirds of jobs in the economy arise from agriculture. However, agricultural sector has been beset with persistent challenges resulting in low farm incomes, low rural employment, lack of food security, and meager agricultural competitiveness. Projects geared towards attainment of sustainable agricultural developments were 1) initiate reforms for higher farm gate prices and establishment of rural credit system, 2) access of farmers' organizations to financing, management expertise, rural employment services and marketing, and 3) modernized food production system for attainment of food security, among others.

Challenges to sustainable agricultural development have been further intensified by the current population of about 100 million and yearly natural calamities that affect agricultural productivity. Programs should focus on more construction of irrigation facilities, farm-to-market roads agricultural trading centers, and semi-processing establishment to guarantee food security and reduction of poverty in the countryside.

An important key player in achieving sustainable development in this sector is the contributions of agricultural education institutions. At present, about 124 universities and colleges, are offering agricultural sciences degrees. These schools were strategically located all over the country, an advantage in bringing the opportunity for the deserving students in rural areas to take up agriculture as their profession. The University of the Philippines Los Baños (UPLB), the premier agricultural university serves as the leader in developing network of an integrated system of agriculture education that effectively respond to agriculture and rural development needs of the country. In partnership with the Commission on Higher Education (CHED), UPLB seeks to address the growing concerns or issues of the drastic decline of student enrollees in agriculture and agriculture-related courses, by offering programs that are responsive to the needs of the domestic and global markets and production of highly competent and competitive graduates. In line with this, CHED initiated the passage of H.B. 2991 or the "Agriculture Education Act of 2010, an act rationalizing agriculture education in the Philippines by establishing a national system of agriculture education institutions, providing for mechanisms of implementation, and for other purposes urges the state to establish, maintain, and support a complete an integrated system of agriculture education relevant to the needs of the economy, community and society". The presentation also intends to discuss the issues and strategic/innovative approaches on academic, R & D and mode of delivery of technical outputs in strengthening agricultural sciences through degree programs with the inclusion of agricultural entrepreneurship geared towards preparing graduates for global opportunities and competitiveness. In addition, is a multi-disciplinary approach with community-based involvement in holistic R & D efforts seeks to attain the goals and objectives set for uplifting the lives of rural farmers.

Transforming Agricultural Education System for Sustainable Development

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Two kinds of factors are mainly involved in agriculture, ***intrinsic factors*** which directly affect the production performance and ***extrinsic factors***, the indirect factors mixed up in the production system. The intrinsic factors are those factors that can be well under controlled and managed by means of husbandry or cultivation: genetics; nutrition; environment; management; and health management. Genetic seems to be the integral part of production scheme whereas the remaining factors are to support or maximize the genetic potential of either animal or plant in terms of performance and quality under the optimum production cost. The extrinsic factors are the ones not directly related to agriculture, however, currently demonstrate high impact to the global agricultural products supply and cost. These factors include prices of petroleum; world economic; hedge funds; disruptions in global crop production; consumer's perceptions on food safety, welfare as well as environmental friendly; and etc. All of these factors cannot be controlled but need to be closely monitored. Though these direct and indirect factors are totally different but they both share the same phenomenon which is their "dynamic" feature.

Science and technology of agriculture during the past decades have developed an understanding of animal or plant genetics, animal or plant nutrition, and animal or plant health in order to produce livestock and plants in a convenient, economical and effective manner. However, the thoughtful knowledge of such disciplines is not able to cope with the current circumstances in which most of the factors involved either directly or indirectly in agriculture are so dynamic. Well understanding of current situation of all factors and develops the situation-dependent agricultural management (Real time agriculture) that are tailored to individual circumstances will be the appropriate approach of agriculture in the future.

The scope of "Agriculture" has been recently broadened from the conventional livestock and plant cultivation to the fundamental of life which includes food, woods, fibers, fuels, medicines, environment, and aesthetics. Moreover, agriculture is no longer considered as sciences or applied sciences but the combination between sciences and arts. As a consequence of these changes, agricultural education system needs to be rapidly transformed in order to provide this new perspective to the students. Hence, the dynamic of direct and indirect factors in Livestock and Plant production as well as the Concept of "Real Time Agriculture", The Concepts of Sustainability and Environmental Friendly, Food Issues (security, safety, and assessment), and Supply Chain Management are the key topics that should be comprised into our current agricultural education.

In order to strengthen the students' understanding about this new perspective of agriculture, both faculty members and students need to work more in the field rather than working in the classroom, library, and laboratory like these days. In this case, "Practical Science", the school motto of Tokyo University of Agriculture seems to perfectly suit this idea. The initial fundamental principle of "Practical Science" lies in the rational spirit in which problems are completely grasped and analyzed considering diversified conditions and eventually solved through pursuing theories and means. Besides working in the field approach, our class room learning system needs to be changed from "Transferring knowledge" which is one way learning approach to "Constructing knowledge" which involves two ways learning approach between instructors and students.

Transforming of our agricultural education system is important and urgent. However, a system wide change to an organization is very complicated. Feeling uneasy and intimidated by the scale of the challenge will be the first barrier in the steps of change. Therefore, good communication among the faculty and students is crucial to create this necessity.

Key words: agricultural education, sustainable development, real time agriculture, practical science

Wastewater reuse: challenges and perspectives for sustainable agriculture in Vietnam

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Rapid population growth and urbanization have led to great demand on clean water consumption while water supply sources become more limited due to a number of factors such as usage for construction, industrial and agricultural activities. Therefore, water reuse and recycle is a need for sustainable development under the uncertainty of climate change and water scarcity. In agriculture, water plays a key role in plant productivity beside nutrients, and technology, thus, continuously feeding fresh water would contribute significantly to the crop production. Due to lacking of fresh water sources, wastewater reuse and recycle have been initiated in industrial and agricultural activities from many countries. In Vietnam, wastewater reuse have been applied in agriculture for a century. However, this activities have been done for many types of crops without further purification. Recent literatures on the occurrence of toxic compounds or heavy metals have drawn attention of scientific consideration on the adequate purification process to ensure treated wastewater are safe for reuse in agriculture.

For treated wastewater to be suitable for the potential reuses without endangering public health and crop productivity, the effluent quality must be as specified following a specific standards. Consequently, the challenges for wastewater reuse in agriculture are that there is no existing guidelines for a certain type of wastewater and the acceptance of operation cost from agricultural practitioners. The quality of treated wastewater is mainly determined by the efficiency of treatment processes and influent qualities. Increasing the concept of cleaner production in safe agricultural practice, appropriate usage water quantity with no waste should be achieved. However, being a low-income country, Vietnam is unlikely to be able to provide adequate wastewater treatment infrastructure. Very little awareness on the severe effect of extreme high toxic chemicals from the use of untreated wastewater inagriculture is known.

The USDA has stated a new concept that sustainable agriculture could be reflected through real-life stories of farmers who are developing sustainable farming systems on their own farms. The application of wastewater reuse and recycle is, therefore, very important to reduce the burden from environment and risks to human health. In fact, a number of scientific research have reported the application of constructed wetland and/or oxidation pond as low cost treatment methods that applicable in the developing countries beside high performance technology for wastewater reuse. Indeed, there is a future perspective for simultaneously wastewater recycle, resources recovery as self-sustain agriculture toward a sustainable society.

Scientific Meeting

Oral and Poster Presentations

A: Plant Production and Environmental Agriculture

B: Aquatic Science

C: Agricultural Science in Society and Economy

D: Forest and Forest Products Science

E: Animal Life Science

F: Agro-engineering

G: Boundary Agriculture

H: Agricultural Chemistry

I: Satellite Session

(Action Research to Promote the Sustainable Development of Local Agriculture in Southeast Asia)

P: Poster Session

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	A-02	GARCIA, Jose Nestor	Community-Based Vulnerability Assessment For Climate Change: Methodology Development
	A-03	RAHIM, Supli Effendi	Developing A Tool For Land Sutability Evaluation Of Plantation Crops In Mobile Android Application
	A-04	JACINTO, Daniel	Household Characteristics And Farmer-Irrigators' Willingness To Pay For Improved Watershed Of The Tumauini Irrigation System (Tis), Tumauini, Isabela
Plant Production **Nov. 7 (Sat) 15:30～17:00** **Room no. 312**	A-30	ODEJAR, Fredric	Underutilized Indigenous Plants From Southern Tagalog Region Of The Philippines With Potential Economic Uses
	A-31	MARILYN, Painagan	Simulation Of Corn Yield In Carmen North Cotabato, Philippines Using Aquacrop Model
	A-32	HARUN, M. Umar	The Effect Of Depths Of Man-Made Biopore On Soil Water Content, Growth, And Yield Of Oil Palm In South Sumatera, Indonesia
	A-33	MARIO, Marigmen	Preliminary Studies On Black Rice: Basis For Development Of Its Sustainable Production Technologies
	A-34	NAKABARU, Mai	The Environmental Characteristic Analysis For Effective Cultivation Of Jatropha In Botswana As Semi Arid And Cold Area
	A-35	Melina, Melina	The Quality Attributes Measurement Of Cocoa Beans In Several Regencies In South Sulawesi
Plant Production **Nov. 7 (Sat) 15:30～17:00** **Room no. 313**	A-60	I KETUT , Suada	The Control Of Clubroot Disease Caused By Plasmodiophora Brassicae Wor. On Cabbage (Brassica Oleracea L. Var. Capitata L.) Using Some Plant Extracts
	A-61	MASANGCAY, Teresita	Mapping Of Bacterial Wilt Population In Potato Growing Areas In Benguet And Mountain Province: An Important Facet In Seed Production
	A-62	LUIS, Janet	Survey And Identification Of Quarantine Diseases And Other Important Diseases Of Economic Crops In Car, Philippines
	A-63	HERLINDA, Siti	Composition And Abundance Of Spiders Inhabiting Paddy Field On Fresh Swamp And Tidal Lowland In South Sumatra, Indonesia
	A-64	SJAM, Sylvia	Combination Of Natural Plant Product As Attractant To Fruit Flies (Batrocera Spp.)
	A-65	DEWI, Vien Sartika	A Superior Cacao Clones Resistant Of The Indonesia Province Of South Sulawsi Against Cacao Pod Borer, Conopomorpha Cramerella Snellen And Helopeltis Sp On Cocao Intercropping System
Social Sciences **Nov. 7 (Sat) 15:30～17:00** **Room no. 411**	C-1	BUDIASA, I Wayan	A Community Establishment For Achieving Implementation Of Integrated Water Resources Management And Sustainable Agriculture At Saba River Basin Level, Northern Bali, Indonesia
	C-2	PORCIUNCULA, Fe	Supply Chain Improvement Of Organically Grown Vegetables In Central Luzon, Philippines
	C-3	PEREZ, Jocelyn	Development Of Pest Management Products And Systems For Organic Vegetable Production In The Cordillera Administrative Region: A Journey From The Laboratory To The Farm
	C-4	GARCIA, Joseph Andrew	A Study Of Consumers' Attitude Towards Organic Vegetables In Metro Manila, Philippines
	C-5	NAJIB, Mukhamad	Consumer'S Perception And Attitude About Organic Food: A Case Study Of Consumers From The Rural And
	C-6	RUEDAS, Mary Yole Apple	Agricultural Extension Workers' Attitude Toward Organic Agriculture In Magsaysay, Occidental Mindoro

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	C-32	KAMARULZAMAN, Nitty Hirawaty	Readiness Towards Halal Logistics Among Food-Based Logistics Service Providers (Lsps) In Malaysia
	C-33	BATES, Bathan	Trade Impacts Of Sanitary And Phytosanitary Measures On Philippine Fresh Banana Exports In Asia, 1990-2014
	C-34	TAGARINO, Darlyn	Channel Choice Of Vegetable Producers In The Cordilleras, Philippines: A Transaction Cost Approach
	C-35	RIZZI ANGELICA, Dagos	Market Chain Analysis Of Hybrid Corn In Sablayan, Occidental Mindoro
	C-36	LUCAS, Marilou	Supply Chain Improvement Of Bamboo: Case Of A Quasi-Integration Model For Region I, Philippines
Animal Life Science **Nov. 7 (Sat) 15:30～17:00** **Room no. 413**	E-01	CRUZ, Emilio	Production Performance Of Backyard And Commercial Goat Farms In Central Luzon, Philippines
	E-02	ORDEN, Edgar	Rural Enterprise Development Through Innovative Goat Production Systems In Nueva Ecija, Philippines
	E-03	LACONI, Erika Budiarti	Strategy Of Beef Cattle Development Based On Agricultural By Product (Study In West Java, Indonesia)
	E-04	RATTANATABTIMTONG, Sukanya	Study On Physical Characteristic Of Commercial Broiler Feed In Thailand
	E-05	PEQUENA, Teresita	Egg Hatchability, Egg Qualities And Profitabilityof Diverse Native Chickens Raised In Varying Confinement Spaces &Amp; Levels Of Pili (Canarium Ovatum) Pulp In The Laying Ration
	E-06	LONTOC, Carla Alilie	Performances Of Gestating Sows Of Different Parities And Breeding Batch In Houses With And Without Evaporative Cooling System
Boundary Agriculture **Nov. 7 (Sat) 15:30～17:00** **Room no. 321**	G-01	CHANPRAME, Sontichai	The Expression Of Mips In Three Genotypes Of Sugarcane Under Salt Stress
	G-02	ESPINO, Marco Rafael M.	Simple Sequence Repeat (Ssr) Marker Based Variety Identification In Philippine Mango (Mangifera Indica L.)
	G-03	TONOGBANUA, Karen	Identifying Variety Specific Loci In Philippine Citrus Collection Using Simple Sequence Repeat (Ssr) Markers
	G-04	YAMAMOTO, Sota	Preliminary Survey On Usage Of Capsicum Spp. On The Yap Islands, Yap State, The Federated States Of Micronesia
	G-05	TANPICHAI, Prasong	New-Generation Of Agriculture Teacher Training Model For Sustainable Development Of Vocational Agriculture Education In Thailand
	G-06	ATTAMANGKUNE, Seksom	Transform Of Agricultural Education System For Sustainable Development

Plant Production **Nov. 8 (Sun) 09:00～10:30** **Room no. 311**	A-06	CHANPRAME, Sermsiri	The Production Of New Chrysanthemum Cultivars Via In Vitro Somaclonal Variation
	A-07	HASMEDA, Mery	Introgression Of Sub-1 Gene To Selected Local Swamp Rice Genotypes By Marked Assisted Backcross (Mab)
	A-08	KONGJAIMUN, Alisa	Fine Mapping And Candidate Gene Prediction Of Pod Length Qtl Pdl7.1+ In Yardlong Bean [Vigna Unguiculata (L.) Walp. Cv.-Gr. Sesquipedalis]
	A-09	MARUBODEE, Rusama	Rad-Seq Analysis For Developing A High Density Linkage Map For Salt Tolerance Qtl Analysis Using A Hybrid Population Derived From Closely Related Parents In Vigna Vexillata
	A-10	TEEINSEREE, Nongluk	Expression Of Alcohol Dehydrogenases (Adh) And Pyruvate Decarboxylase (Pdc) Genes In Jatropha Under Waterlogging Condition
	A-11	SUTJAHJO, Surjono Hadi	Induced Mutations By 495 Gy Gamma Ray Irradiation In Tomato (Lycopersicon Esculentum Mill.)

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	A-37	LENG, Vira	Change In Soil Chemical Properties And Microbial Activities Under Conservation Agriculture Compared With Conventional Tillage In Lowland Rice Agroecosystem In Cambodia
	A-38	PARSON, Saradhuldhat	Fruit Size Increase In 'Khai' Banana (Musa Aa) By Cppu And Ga3
	A-39	KIKUNO, Hidehiko	Study On Vine Propagation For Seed Tuber Production Of Water Yam (Dioscorea Alata L.)
	A-40	KARINTANYAKIT, Pinit	Effects Of Different Greenhouse On Transplanting Succession And Growth Of Banana Plantlets At Pakchong Research Station, Thailand
	A-41	NAVARRO, Baby Richard R.	Comparative Analysis Of The Antioxidant Property And Biopigment Production Of Monascus Purpureus Using Taro (Colocasia Esculenta L Schott) And Tannia (Xanthosoma Sagittifolium (L.) Schott Cv As Substrates
Plant Production **Nov. 8 (Sun) 09:00～10:30** **Room no. 313**	A-66	SITI IZERA, Ismail	Morphological Identification And Molecular Characterization Of Colletotrichum Gloeosporioides Causing Anthracnose Disease On Mango (Mangifera Indica L.) In Malaysia
	A-67	DAMIRI, Nurhayati	Distribution And Control Of Corynespora Leaf Fall Disease On Rubber In Indonesia
	A-68	WIYONO, Suryo	Technique For Field Detection And Inoculation Of Rigidoporus Microporus, White Root Fungus Of Hevea
	A-69	PUJIASTUTI, Yulia	Bioeffectivity Of Bacillus Thuringiensis–Based Product On Media Of Several Agricultural Waste Towards Lepidopteran Insect Pests
	A-70	ROSMANA, Ade	The Impact Of Organic Fertilizer Utilization On Phytopthora Pod Rot And Cocoa Pod Borer Incidences In Cacao Plantation
	A-71	JURUENA, Merlina	Resistance And Susceptibility Of Selected Banana Cultivars To Fusarium Oxysporum F.Sp. Cubense Strains In The Philippines
Social Sciences **Nov. 8 (Sun) 09:00～10:30** **Room no. 411**	C-7	SALLES, Vince Henry	Enabling Factors Associated With The Implementation Of The National Greening Program Towards Sustainable Agriculture In The Philippines As Perceived By The Students Of A Southern Tagalog Agricultural State University
	C-8	HEDREYDA, Cynthia	Enhancing Agricultural Biotechnology Education : The Philippine Experience
	C-9	HAMZAH, Nur Amalina	Local Community'S Perspectives On Marine Park Area In Tinggi And Sibu Islands, Johor, Malaysia
	C-10	CATELO, Maria Angeles	Moving Toward Going Green: Sustainable Productivity Growth In The Philippine Swine Sector
	C-11	CATELO, Salvador	Valuing Natural Ingredients For Sustainable Agriculture
	C-12	DE GUZMAN, Rowena	Evaluation Of The &Quot;Gulayan Sa Paaralan&Quot; (Gpp) In Selected Secondary Schools In Taguig, Philippines
Social Sciences **Nov. 8 (Sun) 09:00～10:30** **Room no. 412**	C-37	MAZLAN, Norida	Pest Management Practices Of Herbs' Farmers In Malaysia
	C-38	MOHD AZAMAN, Nur Nazurah	Factor Influencing Hygiene Practices Towards Minimizing Aflatoxins Contamination In Peanut-Based Products
	C-39	HIDAYAT, Aceng	Capturing Size Restriction Model Of Blue Crab For Improving Small Fishermen'S Income And Resource Sustainability
	C-40	PANGILINAN, Lei	Impact Assessment Of The Fish For Every Family Project In Occidental Mindoro, Philippines
	C-41	DELOS REYES, Julieta	Preference And Consumption Pattern For Specialty Rice
	C-42	NURFADILLAH, Suryani	Indonesian Broiler Competitiveness Towards Asean Economic Community (Aec)

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	E-08	NERAMIT, Sookmanee	Colostral Immunity Against Classical Swine Fever And Aujeszky'S Disease Derived By Oral And Suckle In Piglets
	E-09	JUNLAPHO, Wirawan	Evaluation Of Staphylococcus Aureus And Escherichia Coli Caused Mastitis And Hygiene Control In Milking Process By Using Duplex Polymerase Chain Reaction Technique.
	E-10	RAUNGPRIM, Taweeporn	Kamphaeng Saen Synthetic Thai Beef Cattle Breed
	E-11	MAITREEJET, Wisut	Study Of Steroid-Based Program For Synchronizing Ovulation On Reproductive Performance Of Brahman X Thai-Native Crossbreed And Kamphaeng Saen Cows
	E-12	MAJARUNE, Sutisa	Influence Of Age On Frozen Semen Quality Of Kamphaeng Saen Bulls
Agricultural Chemistry **Nov. 8 (Sun) 09:00～10:30** **Room no. 321**	H-01	THANACHOD, Thammachat	Medical Application Of Mucuna Pruriens Seed Cultivate In Thailand
	H-02	SUSAN MAY, Calumpang	Dietary Risk Assessment Of Insecticide Residues In Fresh Salad Vegetables
	H-03	CAGUIOA, Maria Elena	Molecular And Biochemical Characterization For The Enzymatic Expression Of Osglp8-2 In Developing Rice Grain
	H-04	TRUONG NGOC , Minh	Phenolic Compounds And Antioxidant Of Commercial Phalaenopsis
	H-05	PHUNG, Thi Tuyen	Antioxidant Activity And Phenolic Compounds Of Castanopsis Phuthoensis Luong And Castanopsis Grandicicatricata N. H. Xia &Amp; D. H. Vuong Growing In Vietnam
	H-06	GULUBDDIN, Gulab	Physiological Study Of Tomato (Solanum Lycopersicum) To Keep Fruit Freshness Under High Temperature Condition

Plant Production **Nov. 8 (Sun) 11:00～12:30** **Room no. 311**	A-12	ANGELES, Sugar	Hydration-Dehydration With Agnihotra Ash And Potentization Can Improve Seedling Vigor In Rice (Oryza Sativa)
	A-13	OMAE, Hide	Dissemination Study Of Conservation Agriculture In Ghana And Burkina Faso (4) Development Of Dibbles, And Its Utilization With Rock Phosphate For Pigeon Pea Cultivation
	A-14	AMKHA, Suphachai	Effect Of Silicon Fertilizer For Enhancing Growth And Yield Quality Of Sweet Pepper And Melon In Dwt System
	A-15	SUKKAEW, Eakkarin	Utilization Of Calcium Silicate Fertilizer On Pepper Seedling Production
	A-16	RUNGCHAROENTHONG, Pornpairin	Silicon Induced Trichome In Solanum Seedling
	A-17	SAENGKAI, Kriangkrai	Effect Of Calcium Silicate On Yield And Antioxidant Activity In Pepper
Plant Production **Nov. 8 (Sun) 11:00～12:30** **Room no. 312**	A-42	BANGI, Juliet	Morphogenetic Characteristics Of Traditional Upland Rice Cultivars In Arakan Valley, Cotabato, Philippines
	A-43	ABU SIN, Maizura	Estimation Of Genetic Diversity Among Tropical Forage Corn Inbred Lines Using Molecular Markers And Agronomic Traits For Hybrid Production
	A-44	TANDANG, Leoncia	Characterization, Evaluation And Diversity And Cluster Analyses Of Eighteen Varieties Of Pole Snap Beans In La Trinidad, Benguet, Philippines
	A-45	ABDULLAH, Sumaiyah	Diversity Of Malaysian Lentinus Fr. And Chemical Analysis Of Antioxidative Extract From Mycelia Of Lentinus Squarrosulus Mont.
	A-46	SINTHO WAHYUNING, Ardie	Different Root Anatomical Changes In Salt Tolerant- And Salt Sensitive Foxtail Millet (Setaria Italica L. Beauv) Genotypes
	A-47	DACHAPAK, Sujinna	Genetic Diversity Of Zombi Pea, An Understilized Legume, Assessed By 11 Ssr Markers

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	A-73	NAGPALA, Asuncion L.	Diversity Of Microorganisms In Farms Grown With Semi Temperate Crops In High And Mid-Mountain Zones In Benguet Northern Philippines
	A-74	MUHAMMAD, Rusdy	Impact Of Chromolaena Odorata Invasion On Plant Biodiversity, Botanical Composition And Soil Mineral Contents In Pasture Area.
	A-75	BHUVITARKORN, Samabhorn	Symptom Expression And Transmission Of Columnea Latent Viroid Related To Eggplant Growth Stages.
	A-76	SUPARMAN, Suparman	Response Of Parasa Lepida Cramer (Lepidoptera: Limacodidae) To The Inoculation Of Entomopathogenic Virus Extracted From Naturally Infected Setora Nitens Walker (Lepidoptera: Limacodidae)
	A-77	PRADANA, Ankardiansyah Pandu	Exploring The Potential Of Endophytic Bacterial Consortium As Biocontrol For Meloidogyne Javanica In Tomatoes
Social Sciences **Nov. 8 (Sun) 11:00～12:30** **Room no. 411**	C-13	ROESSALI, Wiludjeng	Management Responses To Farm Risks : Evidence Of Fattening Cattle Business In Central Java Indonesia
	C-14	YUSOFF, Melissa Alina	Constrains, Issues And Challenges In Malaysia Small Ruminant Farming
	C-15	AMBARAWATI, I Gusti Agung Ayu	Rice Farming And Agriculture Insurance In Bali, Indonesia
	C-16	CHAUHAN , Sonali Hasmukh	Adoption, Impact And Sustainable Management Of Medicinal Plant Cultivation For Alternative Income Generation In Tribal Communities In Gujarat
	C-17	AGRUPIS, Shirley	Bioprocessing Of Non-Food Biomass For Sweet Sorghum For Cellulose Ethanol
	C-18	BAGA, Lukman	Islamic Financing Risk Analysis In Agricultural Sector
Social Sciences and Forest Science **Nov. 8 (Sun) 11:00～12:30** **Room no. 412**	C-43	JUWITA, Riskina	Comparison Analysis Of Characteristics And Profitability Of Nutmeg Production In Bogor Regency, Indonesia
	C-44	FALATEHAN, A Faroby	Input Elasticities And Economic Scale Of Red Chilli In District Of Garut, West Java, Indonesia
	C-45	HYAKUMURA, Kimihiko	&Quot;Shakai Jisso&Quot;: A New Trend In Practical Research To Benefit Society In The Field Of Tropical Agriculture—Satreps Projects As Case Studies
	D-01	ELLEN GRACE, Funesto	Effects Of Physicochemical Factors And The Local Ecological Knowledge On The Population Of Helicostyla Daphnis In Borbon And Sogod, Cebu
	D-02	WAN MOHD NAZRI, Wan Abdul Rahman	Fiberboard Made From Cultivated Leucaena And Rubberwood
Animal Life Science **Nov. 8 (Sun) 11:00～12:30** **Room no. 413**	E-13	MARIA, Maria Endo Mahata	The Effect Of Different Combination Of Boiled And Unboiled Tomato Waste In Diet On Broiler Performance And Blood Serum Lipoprotein
	E-14	NURAINI, Nuraini	Durian Fruit Waste Fermented By Phanerochaete Chrysosporium And Neurospora Crassa In Quail Diet: Effects On Laying Performance And Egg Quality
	E-15	SIRATHONPONG, Orathai	The Effect Of L-Methionine Replacement On Broiler Performance And Carcass Trait.
	E-16	SAVEEWONLOP, Nitjawan	Effects Of Different Phase Feeding Program And Forms Of Feed On Broiler Performance And Carcass Traits
	E-17	SRIBOONYONG, Pichet	Glycerol-A Great Potential Source Of Energy For Layer
	E-18	TRAIRATAPIWAN, Tassanee	Determination Of Phosphorus Digestibility Of Mono-Dicalcium Phosphate, Monocalcium Phosphate And Dicalcium Phosphate In Broiler Chickens

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	H-08	DO TAN, Khang	Allelochemicals In Germination Of Rice And Weeds
	H-09	LUONG THE, Minh	Phenolic Compounds Involving In Salinity Tolerance Of Rice
	H-10	NGUYEN, Thanh Quan	Involvement Of Secondary Metabolites In Response To Drought Stress Of Rice (Oryza Sativa L.)
	H-11	YANG, Anhao	Bioactivity Of Root Exudates And Identification Of Allelochemicals From Sweet Sorghum
	H-12	GU, Gangqiang	Biological Control Of Paddy Weeds By Rice Allelopathy
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	A-19	LORN, Vicheka	Effects Of Biochar Made From Rice Husk Or Chromolaena Odorata On Bok Choy (Brassica Rapa Subsp. Chinensis) In Sandy Floodplain, Cambodia
	A-20	SITI AISHAH , Hassan	Andrographolides, Antioxidant Activity And Biomass Of Andrographis Paniculata As Affected By Time Of Fertilization And Ratoon Crop
	A-21	VIJIANDRAN, Rajah	Effect Of Fertilisers Forms On Nitrogen And Potassium Surface Runoff Losses Under Mature Oil Palm
	A-22	YABUTA, Shin	Effect Of Soil Application Of Bio-Char On Jatropha Growth And Water Use Efficiency
	A-23	DEL ROSARIO, Menchie	Response Of Soil Physical-Hydric Variables To Biochar Application
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	A-49	PATRICIO, Marilyn	Integrated Crop Management Adoption For Production And Postharvest Quality In Mango (Philippine 'Carabao' Var.)
	A-50	CERVANTES, Carmelita	Technology Needs For Small Organic Farmers In The Philippines
	A-51	BENEDICTO, Batiles,Jr	Growth And Yield Response Of Tomato (Lycopersecum Esculentum) 'Diamante' Variety On Different Forms Of Fermented Golden Apple Snail (Pomacea Canaliculata) Organic Fertilizer Application
	A-52	JURAIMI, Abdul Shukor	Allelopathic Effect Of Tinospora Tuberculata Leaf On Growth Of Weeds In Rice Field
	A-53	IWAI, Chuleemas Boonthai	Poultry Waste Management By Using Vermicomposting Technology Amended With Different Agricultural Residues
Plant Production **Nov. 8 (Sun)** **13:30～15:00** **Room no. 313**	A-78	SWE, Khin Lay	Bio-Resource Management In Rainfed Farming In Central Myanmar
	A-79	RABENA , Mark Anthony	Spatio-Temporal Pattern Of Water And Soil Nutrients And Grain Yield In The Rice Terraces Landscape Of Banaue, Ifugao, Philippines
	A-80	PURWANTO, Yohanes Aris	Classification Of Sugar Acid Ratio In 'Gedong Gincu' Mango Using Near Infrared Spectroscopy
	A-81	EHSAN, Mohaqqeq	Effect Of Low Temperature Storage On Tomato Fruit Quality
	A-82	DAWLAT, Poyesh	Effect Of 1-Mcp Treatment On Quolity Of Several Vegetables
	A-83	Nguyen Thi Bich THUY	Effect Of Selected Edible Coatings To Extend Shelf-Life Of Longan Fruits Var. 'Huong Chi'

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Nov. 8 (Sun) 13:30～15:00	C-20	MOHD DESA , Haji Hassim	Gac Fruit As A Potential Superfruit For Economic And Social Well Being
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	C-22	LAMADRID, Richel	Strengthening The Vegetable Sector In The Cordillera Administrative Region (Car), Philippines Through An Entrepreneurial Oriented Approach
	C-23	GOTO, Naoko	The Bottom-Up Activities Of Farmer`S Groups In Indonesia -A Case Study At Pemalang District, Central Java-
	C-24	WICAKSONO, Agung	Sugarcane Cultivation After The Ruin Of New Order Regime
Animal Life Science	E-19	NORBERTO, Tadeo	Organoleptic And Physical Characteritics Of Milk From Moringa-Fed Buffaloes
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	E-22	ELLY ROZA, Elly Roza	The Haematological Of Lactation Buffalo Fed A Forage Based On Local Feeding As Feed Supplement
	E-23	SALVEDIA, Claire	Effect Of Probiotic Feeding On Weight Gain, Blood Biochemical And Hematological Indices Of Crossbred Dairy Goat Kids
	E-24	BUAPHAN, Sirirat	Effect Of Crude Glycerin Level In Dairy Cow Diets On In Vitro Gas Production
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Plant Production	A-24	JUNAEDI, Ahmad	Grain Filling Of Rice Varieties As Response To Temperature Elevation Under Plastic House
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Room no. 311	A-26	SUWIGNYO, Rujito A.	Response Of Indonesian Rice Cultivars Different In Submergence Tolerance To Various Fertilizer Applications At Several Submergence Treatments
	A-27	TAUFIK, Muhammad	Utilization Of Microbes And Reduce Fertilizers To Improve Resistance And Yield Upland Rice
	A-28	PHAM THI THU, Ha	Genetic Variability And Diversity In Drought And Yield Component Traits In Rice (Oryza Sativa. L.)
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	A-55	MOHD ISHADI, Nur Adibah	Spinosad Resistance Selected In Field Collected Population Of Diamondback Moth In Selangor, Malaysia
	A-56	I WAYAN, Supartha	Community Characteristics And Potential Of Egg Parasitoids As A Biological Control Agents Of Yellow Rice Stem Borer, Schirpophaga Incertulas Walker {Lepidoptera: Pyralidae} In Bali Of Indonesia
	A-57	KARYANI, Rani Dessy	Suitability Test Of Parasitoid Anagyrus Lopezi De Santis (Hymenoptera: Encyrtidae) On Mealybug Species Associated With Cassava (Manihot Esculenta Crantz)
	A-58	YUNGRAHANG, Sukanya	The Study On Genetic Diversity Of Earthworm From Different Habitat By Coi Gene
	A-59	I WAYAN , Susila	Study On Efficacy Of Nutmeg Essential Oil (Myristica Fragans Houtt) As An Attractant And Botanical Insectiside Of Fruit Fly (Bactrocera Dorsalis Complex)
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	B-03	SANCHEZ, Jacob Anderson	Dna Barcoding Of "Sinarapan", Mystichtys Luzonensis (Smith, 1902) In Four Different Lakes Of Bicol Region
	B-04	PENDATUN , Patarasa	Outcomes Of Pilot Projects Under Capacity Building In Conflict Affected Areas In Mindanao (Cd-Caam) Program
	B-05	RAGASA, Lorenz Rhuel	Analysis Of Immune Related Genes In Milkfish (Chanos Chanos) By Transcriptome Sequencing
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P04	ENCARNACION, Richard	Construction Of A Plant Transformation Cassette Using A Red Fluorescent Protein (Rfp) Gene
P05	LORENZANA, Louella Rowena	Development Of A Bait Trap For Mango Pulp Weevil [Sternochetus Frigidus (Fabr.)(Coleoptera: Curculionidae)] In The Philippines
P06	RAMOS, Margarette	Salicylic Acid Induced Reduction Of Single Cymbidium Mosaic Potexvirus (Cymmv) And Mixed Cymbidium Mosaic Potexvirus And Odontoglossum Ringspot Tobamovirus (Orsv) Infection In In-Vitro Mokara Protocorm Cultures
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A-01 Interest Rate Sensitivity on Loans of Small-scale Farmers in the Philippines

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The agricultural sector of developing countries including the Philippines rely heavily on public intervention and subsidies that are more likely to be very bureaucratic or the source is too far from the beneficiary. Along with this is the dwindling number of families engaging in farming for food and livelihood. Small-scale farming is seen as a solution for food security and livelihood to encourage individuals. However, this view requires an in-depth analysis of how vulnerable to non-sustainability small-scale farms are. Lack of information on how existing small-scale farmers source the capital and finance their production needs is a problem. This paper focuses on borrowing behavior of farmers. It is aimed at determining factors affecting their decision to borrow from formal and informal financial sources. Formal sources such as banks and cooperatives require more documents than informal sources thus, they are less likely to be borrowed from. Though easier to be accessed, loans from informal sources have interest rates reaching as high as 40%. This research can help policy makers in drafting a reasonable package to offer to farmers. Data used in this study is from a survey of farmers in the Philippines conducted from November to March 2015. A two-step regression model was estimated to determine what scenario will more likely make the small-scale farmer's decision to borrow from informal source to change to formal. The data set was divided into training and validating data sets. Simulations were done to determine the model consistency and reliability. Switching probabilities were then computed.

Keywords: small-scale farming, interest rate, two-step regression, switching probability

A-02 Community-based Vulnerability Assessment for Climate Change: Methodology Development

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A community-based vulnerability assessment tool named, VAST-Agro was developed to provide an easy to use guide for identifying vulnerable agricultural areas in a community, which can be done in a quick but organized manner. The tool makes use of a field questionnaire that can be accomplished through focus group discussion in the community. It is a product of the integration of agricultural variables, often used for describing agricultural systems and designing appropriate internventions, and actual experiences and observations about agriculture may provide provide reliable conclusions as to what agricultural areas and communities in the province need immediate and appropriate adaptation measures.
The tool was developed based on the IPCC definition of vulnerabilty, which is "a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity and its adaptve capacity". Exposure to a climate event and sensitivity to that event could be deduced as potential damage and that potential damage may be offset by the adaptive capacity, resulting in a particular vulnerability level for a system. Following this definition, climate and agricultural variables were identified and examined as to their relevance and practical application at the community level. A rating scale for each of the variable was done with corresponding qualitative description to make the assessment simple, easy to understand and easy to use. A vulnerability index from -1.0 to 1.0, with -1.0 as the highest vulnerability, was developed to give comparative evaluation of various areas being assessed.

Keywords: Climate change, Vulnerability assessment, Vulnerability index, Adaptive capacity, Climate sensitivity

A-03 Developing a Tool for Land Sutability Evaluation of Plantation Crops in Mobile android Application

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Evaluating land suitability for special purposes e.g. for plantation is a must, as to understand important factors to be considered in managing the land successfully. A framework for evaluating the land suitability for purposes in agriculture especially in plantation is first introduced by Food and Agriculture Organisation (FAO) in late 1970s. Using this framework, researcher or land users analyze the suitability of their land, whether it is very suitable or only marginally suitable, or not suitable at all to grow some particular plants. Unfortunately, applying the framework manually is time consuming and not of interest of land users especially students in agricultural sciences. Available technology in mobile applications nowadays has been suggested in many area of solving problem. Authors have developed a tool for land suitability evaluation by transforming the FAO framework into smart mobile application. This application is designed by using simple language for each variable (factor) and also by utilizing expert system theory called case base reasoning (CBR) algorithm. The factors that are involved in program are land characteristics such as soil type, depth of soil solum, soil fertility, pH, drainage, risk of flood, etc.

The application is found to be easier to understand and also could automatically determine the suitability of land. The purposed idea in this application is believed to be useful for land users, students, farmers, Companies and Government Officers.

Keywords: confirmity tool, land suitability evaluation, FAO framework, plantation crops

A-04 Household Characteristics and Farmer-irrigators' Willingness to Pay for Improved Watershed of The Tumauini Irrigation System (tis), Tumauini, Isabela

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The study was conducted on 185 farmers from irrigators associations (IAs) in Tumauini, Isabela to determine their willingness to pay additional charges for improved environmental services. Most respondents were males (125), 50% have not reached high school, 97% full-time farmers, and with an average of 4 members per household. Annual income of 66% is below P10,000, 34% avail of loans from banks and traders; 50% are owner-tillers and the rest are tenants. Average farm size is 1.94 hectares per farmer with an average yield of 124 cavans per hectare (5.5 tons/ha) and traded at an average price of P17/kg.

The farmers claimed that environmental conservation is vital and environmental degradation were caused by lack of discipline, vested interests, illegal logging, forest destruction, mining, and excessive use of fertilizers and pesticides which resulted to flash floods, soil erosion, pollution of the rivers, and decrease in the water level. With these changes, most are aware of the cropping calendar and pattern of planting for smooth farming operations and synchronous planting.

They stressed that improved water quality is important for farming and some participated in irrigation activities such as clearing, de-clogging, de-silting and water delivery monitoring and planning. Most importantly, the respondents are willing to pay additional charges for environmental services ranging from P50.00 to P1,000.00 or an average of P265.00 and agreed to pay from P50.00 to P250.00 per year. This will serve as a kick-off point in enhancing their capabilities in improving irrigation services and facilities in their respective localities.

Keywords: WILLINGNESS TO PAY, ENVIRONMENTAL SERVICES, IRRIGATION SERVICES

A-06 The Production of New Chrysanthemum Cultivars Via in vitro Somaclonal Variation

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Chrysanthemum is a popular cut flower of high economic value. Consumers always demand for new cultivars with new flower color or type. In case of chrysanthemum, several new commercial cultivars were resulted from induced mutation. However, the selection of new cultivars from somaclonal variation *via* callus induction and plantlets regeneration are also applicable. In this report, mature petals from ray florets of 5 spray type commercial chrysanthemum cultivars, two cultivars of button and decorative type and one daisy type were used. Callus was induced on solid MS medium containing the combination of 0- 3 mg/l BA and 0.1-1 mg/l 2, 4-D followed by plantlets regeneration on solid MS medium supplemented with 0-3 mg/l kinetin. Plantlets were then rooted on PGR-free solid MS medium prior to transplanting into the field. Plant growth regulators supplemented in culture medium exerted their roles in callus induction and plantlets regeneration i.e., the medium containing only BA or 2, 4-D could not be able to induce callus. At the blooming stage, variations in flower color and form were revealed. In the button type cultivars, changes in flower form (from button type to semi-double daisy type) were observed whilst no color change observed. Interestingly, there were various degrees of change in flower form in both cultivars. In the decorative type cultivars, only variation in flower color (from the hue of red/pink to red/orange/yellow) observed but flower form was normal. For the single daisy type, no variation observed in all of the plant.

Keywords: chrysanthemum, callus, variation, flower

A-07 Introgression of Sub-1 Gene to Selected Local Swamp Rice Genotypes by Marked Assisted Backcross (mab)

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Stress submerged due to global climate change was still a barrier for rice production in swamp area. One of efforts to overcome this problem was the use of superior varieties which were tolerant to stress submerged. The aim of this research was to increase the resistance of local swamp rice genotypes to stress submerged by inserting *Sub-1* gene in order to produce new superior swamp rice varieties which are tolerant to stress submerged. To select the genotypes which carried the *Sub-1* gene, marked assisted backcrossed with RAPD method was used. The breeding method was conventional backcrossing. The selection of gene target was conducted molecularly by *Marker Assisted Backrossing (MAB).* Based on best growth performance as well as quality dan quantity production, there were four superior local swamp rice genotypes were selected. They were "Payak Selimbuk", "Siam", "Pegagan" and "Pelita Rampak". Four selected genotypes were *Top cross* with FR13A, genotype which carried *Sub-1*gene, to get the F1 progeny. After that the F1 progeny were backcrossed with local selected genotypes as source of pollen. BC_1F_1 were analyzed by using RAPD method to identify the population that carried the *Sub-1* gene. The population that carried the *Sub-1* gene were further analyzed during vegetative growth stage under submerged stress. The result showed that by using mark assisted backcrossed was able to identify gene target in shorten time. In order to develop new variety this research will be continue until BC_5F_1 to get more stable genetic material for new variety.

Keywords: MAB, Sub-1 gene, swamp, local rice

A-08 Fine Mapping and Candidate Gene Prediction of Pod Length Qtl Pdl7.1+ in Yardlong Bean [vigna Unguiculata (l.) Walp. Cv.-gr. Sesquipedalis]

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Yardlong bean is an important legume of Southeast and East Asia. It is believed to have been domesticated from vegetable (pod) cowpea. The yardlong bean is grown principally for its immature long pods, which are consumed fresh or cooked. Interestingly, only yardlong bean has remarkable gigantism for pod length among economically important legumes. Previously, we identify a major QTL, *pdl7.1+* for pod length (PDL) on linkage group 7, which is located on pleiotropic quantitative loci for pod- and seed-related traits. The pod- and seed-related traits are highly complex quantitative traits that are controlled by multiple quantitative loci (QTLs) with a major and several minor effects and are influenced by multiple genetic and environmental factors. Thus, it is challenging to identify a major gene for controlling pod length in yardlong bean. In 2010, *pdl7.1+* with a large effect, increasing the pod length by 30.5%, was detected between marker cp07863 and CEDG111 with a marker interval of 12.3 cM (or 4.36 Mbp) using BC_1F_1 population from a cross between yardlong bean accession `JP81610` and wild cowpea accession `JP89083` and then backcross to JP81610. In 2014, *pdl7.1+* was re-evaluated in a segregation population derived from 1358 BC_3F_2 plants and confirmed that it was located in this target region. To narrow down the target region, 25 markers, developed from azuki bean genome information, were successfully mapped and used for selecting BC_3F_3 genotypes with recombination within the target region. In 2015, phenotypic segregation of selected 160 BC_3F_3 progenies screened from genotyped 1536 BC_3F_3 individuals was evaluated. As a result, the position of *pdl7.1+* was narrow down to a critical region of 0.6 Mbp. Candidate region will be used for sequence comparison between recombinant plants for identifying the target gene.

Keywords: Pod length, yardlong bean, Vigna unguiculata, QTL, Fine mapping

A-09 Rad-seq Analysis for Developing A High Density Linkage Map for Salt Tolerance Qtl Analysis Using a Hybrid Population Derived From Closely Related Parents in Vigna Vexillata

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V. vexillata (tuber cowpea, n=11) is a promising crop for producing food in marginal lands having various environmental stresses. For the salt tolerance QTL mapping in *V. vexillata,* we have developed a hybrid population consist of 300 F_2 individuals using salt tolerant 'V1' and susceptible 'V5' accessions as parents. A total of 1,336 SSR markers developed from related *Vigna* species were screened. However, since the parental accessions were genetically close to each other, only 83 SSR markers showed polymorphism between parents. These markers could be assigned to 11 linkage groups (LGs) covering a total length of 510.5 cM at an average marker distance of 7.2 cM. The LGs 1, 2, 6, 8 and 9 had gaps greater than 15 cM between markers. To increase the number of markers, we have conducted Restriction-site associated DNA sequencing (RAD-seq) analysis using Illumina HiSq 2000 sequencer. As a result, we could add 475 RAD markers on the 11 linkage map resulting in a map covering 973.9 cM of map distance with the average marker interval of 1.8 cM. For the salt tolerance QTL analysis, shoot wilt experiments were conducted 2 times in 2013 and 2014. When we compare the common QTLs identified in both years, SSR map detected 2 common QTLs on LG 2 and LG9, while combined RAD-SSR map could detect 3 common QTLs on LG2, LG9 and LG11. In addition, we could narrow down the QTLs position from neighboring markers dramatically.

Keywords: Hybrid population, QTL, RAD-seq, Salt tolerance, Tuber cowpea

A-10 Expression of Alcohol Dehydrogenases (ADH) and Pyruvate Decarboxylase (PDC) Genes in Jatropha under Waterlogging Condition

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Jatropha (*Jatropha curcas*) is a potential biodiesel crop. Jatropha is relatively tolerant to drought and salinity, but highly sensitive to waterlogging which can result in growth retardation and yield reduction. This study aimed to analyze the expression of waterlogging responsive gene, *ADH* (alcohol dehydrogenase) and *PDC* (pyruvate decarboxylase), in Jatropha. The two month old Jatropha seedlings, 'Chai-nat', were submerged under 30 cm depth for 15 days. Changes in the total leaf water potential (Ψt), the maximum quantum yield (Ødark) and morphological traits were monitored during the experiment. The results showed that the total leaf water potential and the maximum quantum yield were decreased along with the water logging duration. The levels of leaf chlorosis, stem cracking and root rot were increased according with the increment of stress duration. Real-time PCR was performed to determine the expression levels of putative *PDC* and *ADH* genes in leaves and roots of waterlogged Jatropha. It was indicated that the *PDC* and *ADH* gene was up-regulated and showed the highest expression of *PDC* gene in leaves and roots of waterlogged Jatropha at 12 hr and 24 hr, respectively. For the expression of *ADH* gene, the 12 hr and 6 hr of waterlogging showed the highest expression.

Keywords: Physic nut, flooding, low oxygen, Jatropha curcas

A-11 Induced Mutations by 495 Gy Gamma Ray Irradiation in Tomato (lycopersicon Esculentum Mill.)

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Genetic variability of plants is an important thing in plant breeding. Induced mutation by gamma ray irradiation proven to increase plants genetic variability. This research aimed to identification the respons of gamma ray with 495 Gy to local genotypes of tomato. Based on observations at qualitative and quantitative characters in M0, M1, and M2, gamma ray irradiation can influences the growing and development of tomato. The result showed that gamma ray irradiation causes plants genetic variability. Gamma ray irradiation influences height of plant, weight of production, diameter of fruit, and total dissolved solids significantly. Genetic variation at M2 generation showed the increase on height of plant, weight of production and diameter of fruit than M0 and M1.
Key words: tomato, irradiation, gamma ray.

Keywords: tomato, irradiation, gamma ray

A-12 Hydration-dehydration With Agnihotra Ash and Potentization Can Improve Seedling Vigor in Rice (oryza Sativa)

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Hydration-dehydration (HD) is a conventional seed invigoration approach to improving seedling performance by subsequent wetting and drying back of seeds to their original moisture content. Seedlots processed by HD are reported to have higher germination percentages and vigorous seedlings with better yield potential and/or stress threshold than seedlots that did not undergo HD. In this study, HD with agnihotra ash and potentization was investigated. The study consisted of two independent experiments using rice varieties 'PSB Rc 18' and 'NSIC Rc 220H'. In both experiment HD was done by soaking low vigor seeds acquired through artificial aging in water and then air-drying overnight. Experiment 1 was soaked using the standard 12-h duration while the duration of soaking was shortened to 6 h in Experiment 2. The water for HD was either plain or "potentized" (mixed in alternating reversed directions for 20 min) with or without the addition of agnihotra ash. Agnihotra ash is a product of Agnihotra, an Indian practice of burning cow dung in a specified copper pyramid at sunrise and sunset. The parameters measured were seed germination percentage, seedling vigor expressed as first count, seedling length, seedling dry weight and seed moisture content.
In general, final germination, first count, seedling length, seedling dry weight and moisture content of rice seedlots were improved by plain HD. Further enhancement in all parameters was effected by potentization and supplementation of agnihotra and cow dung ash (w/v).
The ranking generally proceeded as follows: 1% agnihotra ash, 0.01% agnihotra ash, 1% cow dung ash, 0.01% cow dung ash, and HD only. For practical invigoration, 0.01% agnihotra ash (or 100 mg in 1000 ml water) is recommended. But to further improve seed response 1% agnihotra ash may be used along with potentization. Yet, cow dung ash could be a suitable alternative especially in the absence of paraphernalia.

Keywords: agnihotra, biodynamic farming, seed enhancers, hydration-dehydration, seed invigoration

A-13 Dissemination Study of Conservation Agriculture in Ghana and Burkina Faso (4) Development of Dibbles, and Its Utilization with Rock Phosphate for Pigeon Pea Cultivation

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Utilization of pigeon pea gives high benefit to realize conservation agriculture in West Africa when used as a perennial relay crop, because it can continuously grow even in dry spell and contribute as green manure and as cover crop. We, however, are facing a difficulty to cultivate it in Sudan Savanna where a drought is too serious. In order to enhance the root development of pigeon pea prior to dry spell, we manufactured simple dibbles that can assist the root growth. After digging holes (1.6cm in diameter) with different depth (-20, -40, -60, -80cm), the holes were filled with three different materials (rock phosphate, manure, manure and rock phosphate with 1:1 ratio) or kept without filling. After sowing 6 grains of pigeon pea following farmers practice on the filled hole or just besides the hole before or after rainy season in Japan, Ghana and Burkina Faso, we investigated germination rates after one month of sowing, and plant height, NO. of branches, leaves, stems and root weight (fresh and dry) after two months of sowing. We also analyzed C, N and P contents of each plant part. The results in Japan indicate that manure increased germination rate by 52% ($P < 0.05$). Rock phosphate increased dry leaf, stem and root weight by 55, 47 and 67%, respectively, increased main root length by 206%, root diameter by 80%, and total nitrogen content of leaf by 8% ($P < 0.05$). Effect of holes depth on the root growth, however, was not clear.

Keywords: Conservation Agriculture, Sudan Savanna, Pigeon pea, Ghana, Burkina Faso

A-14 Effect of Silicon Fertilizer for Enhancing Growth and Yield Quality of Sweet Pepper and Melon in Dwt System

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The studies of silicon (Si) from calcium silicate (Ca_2SiO_4) fertilizer for growth and yield quality of sweet pepper and melon were investigated in DWT (Deep Water Technique) system. The research was divided into two experiments. Experiment 1 was the effect of Si fertilizer in nutrient solution on growth and yield quality of sweet pepper. The experiment was operated in Completely Randomized Design (CRD) with 10 replications and 5 treatments (0, 0.01, 0.1, 10 and 10 mg/l). The results were shown that Si 1 mg/l into solution was the best of plant growth and yield quality of sweet pepper. In addition, experiment 2 was the effect of Si fertilizer in nutrient solution on growth and yield quality of melon. The experiment was using CRD with 10 replications and 6 treaments (0, 0.01, 0.1, 1.0, 10 and 100 mg/l). The results were shown that the Si fertilizer at 1, 10 and 100 mg/l in nutrint solution gave the higher fruit width, fruit lenght, fruit weight and fruit thickness of melon than those others.

Keywords: Fertilizer, Melon, Soilless, Silicon, Sweet pepper

A-15 Utilization of Calcium Silicate Fertilizer on Pepper Seedling Production

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Silicon can be classified as beneficial element. Many plants show the better growth as the silicon from available (H_4SiO_4 or SiO_4^{2-}). The pepper production to silicon in soil Thailand is not cleared. Thus purpose of this research is to study the rate and application method of silicon fertilizer appropriated for pepper seedling production. This study was divided into three experiments. Experiment 1 was the effect of calcium silicate (Ca_2SiO_4) fertilizer application in pepper by soil drench method. Experiment 2 was the effect of Ca_2SiO_4 fertilizer application in pepper by foliar method. Experiment 1 and 2 using 2x6 Factorials in Completely Randomized Design (CRD) with 4 replications. Factor A was seed preparation methods and factor B was application rates of Ca_2SiO_4 fertilizer. Experiment 3 was the effect of Ca_2SiO_4 fertilizer application in pepper by foliar with soil drench method by using CRD with 4 replications and 7 treatments. From the 1st experiment, the results were showed that the seed priming method at a rate 2 g L^{-1} with Ca_2SiO_4 fertilizer application by soil drench at a rate 120 kg ha^{-1}, the 2nd experiment, seed priming method at a rate 2 g L^{-1} with Ca_2SiO_4 fertilizer application by foliar at a rate 2 g L^{-1} gave the highest plant growth and total silicon in pepper seedling. The 3rd experiment, foliar application method (50%) with soil drench application method (50%) gave the highest plant growth and total silicon in seedling. Then, Ca_2SiO_4 fertilizer application can be employed for enhancing plant growth of pepper seedling and increasing silicon content in seedling.

Keywords: Foliar, Fertilizer, Seedling, Silicon,Soil

A-16 Silicon Induced Trichome in Solanum Seedling

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The effects of silicon (Si) from calcium silicate (Ca_2SiO_4) fertilizer on density of trichome, vascular bundle diameter and leaf thickness in eggplant and tomato seedling were investigated. The experiment was done at Faculty of Liberal Arts and Science, Kasetsart University Kamphaeng Saen Campus, Thailand. The experiment was completely randomized design. In eggplant was applied Ca_2SiO_4 at 0, 8, 10, 12, 14 and 16 g/l. Also, in tomato applied Ca_2SiO_4 at 0, 1, 2, 4, 8, 10 and 12 g/l. The number of trichome, vascular bundle diameter and leaf thickness were examined at third leaves from shoot. The results showed that Ca_2SiO_4 application induced the number of trichome, vascular bundle diameter and leaf thickness in both eggplant and tomato. Ca_2SiO_4 application at 8-14 g/l induced the number of trichome in eggplant. But, the higher the concentration of Ca_2SiO_4 at 16 g/l in eggplant, the lower the number of trichome, vascular bundle diameter and leaf thickness was. Application Ca_2SiO_4 in tomato induced the density of trichome and vascular bundle diameter. Moreover, Ca_2SiO_4 at 1-8 g/l induced leaf thickness, but at 10-12 g/l decreased leaf thickness. Finally, Ca_2SiO_4 application induced the density of trichome benefit for solanum seedling production and can reduced insect attraction.

Keywords: Eggplant, Tomato, Seedling, Silicon, Trichome

A-17 Effect of Calcium Silicate on Yield and Antioxidant Activity in Pepper

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Utilization calcium silicate was observed on yield and the antioxidant potential of pepper. The experiment was done at Kasetsart University, KamphaenSaen campus, Thailand. Experimental was completely randomized design with10 replications and 4 treatments as 0, 62.5, 125 and 250 kg ha^{-1}. Total phenolic compound content, carotenoid content, chlorophyll and antioxidant activity were analyzed in leaves and mature fruits. The antioxidant activity was evaluated using 2, 2-diphy-l-picryhydrazyl (DPPH) radical scavenging activity assay. The resulted showed that phenolic compound and chlorophyll were increased with high rate of calcium silicate in leaves. Also, antioxidant activity was higher level of scavenging on calcium silicate application than the control in leaves. After harvested fruit, the higher the rate of calcium silicate, the more of total phenolic compound and carotenoid content was. Furthermore, calcium silicate promoted fruit growth and yield higher than control. From this result it seems to be calcium silicate beneficial in pepper production for human health.

Keywords: Antioxidant activity, Calcium silicate, Chlorophyll, Phenolic compound, Pepper

A-18 Chemical Characteristics of Abandoned Mine Tailing Ponds Amended With Varying Levels of Compost in Mankayan Benguet, Philippines

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Continuous mining operations in Mankayan, Benguet has led to the production of four abandoned mine tailing ponds which contains high copper concentration. These mine tailings have poor physico-chemical properties, with high levels of copper determined to be >150 ppm, inhibiting plant growth resulting to low vegetation cover. There is a need to remediate these mine tailings to support plant growth and a need to investigate the use of compost in remediating copper contaminated soils. This study was conducted to determine the different physico-chemical properties of mine tailings, monitor the change in their soil properties with the application of different levels of compost and determine the plant species capable of surviving in copper contaminated soil materials in Bgy. Paco, Mankayan, Benguet. In this study, soil materials from TP4 and TP3 were used and examined to verify the role of organic matter in phytoremediation. TP4 is an abandoned tailing pond which was amended by the intentional addition of soil and accidental inputs of municipal wastes. It is currently being utilized as a pasture land. TP3 is an abandoned mine tailing pond with no added amendments
Results showed that application up to 6.6 kg m^{-2} (4%) compost significantly improved pH in plots that utilized TP3 materials compared to unamended plots. However, there were no significant differences on OM and exchangeable copper concentration. On the other hand the addition of any level of compost to TP4 materials did not result in any significant changes indicating that these materials are already stable. However 5 kg m^{-2} compost amendment to control plots using agricultural soil significantly improved its soil final pH, but any levels of compost added did not have any significant changes on other soil properties. Compost application of 4% (6.6 kg m^{-1}) and 8% (13.2 kg m^{-1}) applied to soil materials from TP3 increased soil productivity due to improved OM led to doubled vegetation cover from 18.33% of 0% compost application to 47.33% at 8% application.

Keywords: COPPER, TAILING PONDS, COMPOST APPLICATION

A-19 Effects of Biochar Made From Rice Husk Or Chromolaena Odorata on Bok Choy (brassica Rapa Subsp. Chinensis) in Sandy Floodplain, Cambodia

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Improvement of crop growth and soil properties by combined effects of rice husk biochar with compost was rapidly increased. However, biochar made from *Chromolaena odorata* has not been tested as biochar. Therefore, the objective of our research was to compare the effects of biochar made from rice husk and *Chromolaena odorata* combined with compost on crop and soil properties in floodplain, Cambodia. The research was conducted in the sandy floodplain, Kompong Thom Province, Cambodia from April to September, 2015. Bok choy (*Brassica rapa* subsp. *chinensis*) was grown in the 1 m^2 plot. Four treatments were prepared with four replications. The application treatments were Cl (control), Ct (compost), RCt (rice husk biochar + compost), and CCt (*C. odorata* biochar + compost). Biochar (10 Mg ha^{-1}) and compost (10 Mg ha^{-1}) were applied before planting bok choy. Plant growth and soil properties were measured. CCt application was significantly superior to others in yield and root biomass followed by Ct and RCt. After harvesting, pH value varied between 4.2 and 5.3 and decreased in the order of CCt, RCt,

Ct, and Cl. Available nitrogen, total carbon, and cation exchange capacity was not significantly different among the treatments but available phosphate was significantly highest in CCt. This suggested that CCt could improve crop growth and some soil properties followed by RCt or Ct. RCt and Ct has similar effects on crop and soil properties. Thus, biochar made from *C. odorata* with compost is considered a potential amendment to improve crop growth and soil properties.

Keywords: Rice husk biochar, Chromolaena odorata, Chromolaena odorata biochar, Sandy floodplain, Cambodia

A-20 Andrographolides, Antioxidant Activity and Biomass of andrographis Paniculata As Affected by Time of Fertilization and Ratoon Crop

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The nutrient uptake pattern in plants varies during progressive stage of development. Hence fertilization should be done according to plant needs. Quantity and type of fertilizer applied as well were reported to influence phytochemical composition of herbal plants. For *A.paniculata* where aerial part is the major plant part used, providing plants with a sufficient nutrient during rapid vegetative growth will improve yield and phytochemical content. Thus study to identify the time of the most effective organic fertilizer application to improve foliar production and phytochemical composition need to be conducted.
A field experiment was conducted on silty clay soil and sprinkler irrigated daily. Five week-old hempedu bumi seedlings were planted on beds ($1m^2$ /treatment/rep.). Prior to fertilization, 15 tan/h of EFB biochar was uniformly incorporated into the soil. Organic fertilizer at the rate equivalent to 210 N kg/ha was applied according to the following fertilization timing tested: 1) 100% at transplanting, 2) 75% at transplanting + 25% at 3 weeks after transplanting (WAT), 3) 50% at transplanting + 50% at 3 WAT, 4) 34% at transplanting + 33% at 3 WAT + 33% at 6 WAT. Treatments were replicated six times and arranged in RCBD. Two cycles of ratoon cropping was conducted (similar rate of organic fertilizer and fertilization schedule were applied for each ratoon). The plants were harvested when it showed early sign of flowering by cutting the main stem at 10 cm above the ground level (leaving 4 branches intact). Leaves and stems were separately oven dried at 50°C for 6-7 days for biomass and selected photochemical content analysis: total phenolic, antioxidant activity and andrographolides. The andrographolide (AG), neoandrographolide (NAG) and 14-deoxy-11,12 idehydroandrographolide (DDAG) concentrations were detected in DCM:MeOH (1:1 v/v) extract by reverse phase HPLC. Antioxidant activity was measured by DPPH assay and FRAP method.
Split fertilizer applications has delayed flowering. However, based on biomass yield, total phenolics, andrographolides and antioxidant activities, 100% of organic fertilizer applied at transplanting showed no significant difference with split application. Ratoon cropping was found to be economically feasible. The first ratoon crop had the highest shoot dry weight compared to the dry weights of the first harvest and second ratoon crop. The biomass of the first ratoon and second ratoon crop was increased respectively for up to 392% and 134% over the first harvest for one fertilizer application. Andrographolides, an important marker for *A.paniculata* found to be insignificant between fertilization schedules for the first and second harvest. There were no significant interaction effects for all evaluated parameters. Results suggested that organic fertilizer at equivalent rate of 210 kg N/ha to be applied once, at transplanting only and using 1 ratoon cropping for optimum biomass yield of *A. paniculata.*

Keywords: Andrographis paniculata, Phenolics, andrographolides, ratoon crop, biomass yield

A-21 Effect of Fertilisers forms on Nitrogen and Potassium Surface Runoff Losses Under Mature Oil Palm

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Nitrogen and potassium are the two most important nutrient needed by oil palm to sustain high yields. This study was conducted to understand the effects of fertiliser forms (straights, compounds and controlled released fertilisers) on nitrogen and potassium losses by surface runoff. The study was conducted in a mature oil palm field using three 20 by 6m erosion plots set up at Lima Blas Estate (3° 45' 15.762" N, 101° 20' 23.798" E) in Selangor, Malaysia. Each experimental plot contained two palms. The soil type was serdang series (Typic Kandiudults) with slopes ranging between 5.5° to 7.5°. Palms in each plot were either fertilised with straights, compounds or controlled released fertilisers at equal amounts of nitrogen and potassium. Nitrogen and potassium losses in the eroded sediment and runoff water were measured at every rainfall event for a period of 24 months.

Total rainfall recorded for the first and second year was 2883 and 2441 mm respectively. Mean soil loss over the 24 months of study ranged between 7.74 to 17.06 t per hectare for the three plots. Runoff water losses ranged between 512 to 596 mm for the three plots. Significant differences were noted in the soil loss between the three plots while runoff water losses did not show any significant differences. Average nitrogen loss in the sediments for palm fertilised with straight, compound and

controlled released fertilisers were at 8.63 kg, 12.00 and 12.33 kg ha^{-1} respectively while the average losses in the runoff water were at 31.49, 26.12 and 20.50 kg ha^{-1} respectively. Potassium losses were much lower in the sediments at 4.32 kg ha^{-1} for straights, 5.25 for compounds and 14.37 for controlled released fertilisers. Potassium losses in the runoff water however were much higher compared to nitrogen for all three treatments at 38.09 kg ha^{-1} for straights, 33.41 for compounds and 33.56 for controlled released fertilisers. Losses in the runoff water were significantly higher than the eroded sediments similar. Higher losses were noted in palms fertilised straight fertilisers for both nitrogen and potassium fertilisers in the runoff water. The results suggest the possibility of applying compound and controlled released fertilisers at a lower rate by an average of 15% compared to straights to fulfil the oil palm basic nutrient requirement.

Keywords: Nutrient Loss, Surface Runoff, Nitrogen, Potassium, Oil Palm

A-22 Effect of Soil Application of Bio-char on Jatropha Growth and Water Use Efficiency

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Jatropha curcus has a higher tolerance to drought and can grow well under poor soil conditions, therefore it has been introduced into sterile area. In that case, the irrigation and fertilization are important to get the high biomass productions. But it is difficult to obtain the chemical fertilizers and water in such area. Many reports show the efficiency of bio-char as for fertilizer and soil conditioner. Jatropha produce not only oil but also many kind of biomass, for example pruned branch, husk and so on. So the effects of soil application of jatropha char on soil physical property, plant growth and water use efficiency (WUE) were investigated.
The 32 seedlings were transplanted in 1/5000a pots which were filled with 4 kinds of soil, namely mixed with fine char (FC) and large grain char (LG), covered with char mulch (M) and no char application (Cont). 5 days after transplant, the irrigation with 2 different levels of soil water availability as a standard was started. All pots were weighed and supplied water in every morning. Both evaporation and transpiration of FC and LG were higher than M and Cont. Total dry weight of FC and LG also were higher than others, but WUE was decreased in Cont, M, LG and FC order. In conclusion, any soil applications of char did not show the restraint of evaporation from soil surface. WUE of FC and LG were lower than others, however in comparison with the ratio of transpiration and evaporation, FC and LG showed the value which is higher than others. It was suggested that the irrigated water were used efficiently by mixing char with soil.

Keywords: oil plant, bio-char, water use efficiency

A-23 Response of Soil Physical-hydric Variables to Biochar Application

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This study explored the potential of biochar to alter soil physical-hydric properties that affect soil and moisture conservation and water use efficiency. Effects were determined through a pot experiment on Completely Randomized Design with three replicates. Soil was treated with biochar from twigs and rice hull applied at 0, 10, 20 and 30 t-ha^{-1}. A 2 x 3 factorial field experiment in randomized complete block design with three replicates verified the effect of biochar and fertilizer applied to sweet corn production. Treatments were 0 and 20 t-ha^{-1} rice hull biochar combined with 0, 50 and 100% of recommended fertilizer. Biochar significantly reduced soil bulk density thereby increasing porosity. Greatest effects were on the application of 30 t-ha^{-1} rice hull biochar followed by the same rate of twigs biochar. Saturation and field capacity also increased with increasing levels of biochar. Greater moisture retention was also observed with biochar. The higher the level of biochar, the greater the moisture retained in the soil each day. This was corroborated by the result of the biochar effect intensity which showed highest value for twigs followed by rice hull, both at 30 t-ha^{-1}. On the field experiment, fertilizer and rice hull biochar separately and significantly increased yield and water use efficiency. These results indicate the potential of biochar to conserve soil moisture

Keywords: biochar effect intensity, moisture retention, soil properties, soil and water conservation, water use efficiency

A-24 Grain Filling of Rice Varieties As Response to Temperature Elevation Under Plastic House

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One possible impact of global warming is increase of athmosphere temperature that may affect to rice growth and production as well as grain filling. The aim of this research was to determine of grain filling response as dispersion on tip-base and primary-secondary branch of grain position in the panicle of some rice varieties at high temperature under plastic house. Rice plants were grown under three specific compartment of polyethylene house to create temperature differences as a main-plot, while rice varieties, namely IR64, Ciherang, Way Apo Buru, and Jatiluhur were randomised as sub-plot. Rice plants were grown in the plastic container containing about 83 kg air-dried soil, with six plants per box using planting space of 20 cm to 20 cm. Daily air temperature in each compartment as maximum and minimum were 35.4 and 21.7ºC, respectively for T1; 37.1 and 21.9 ºC, respectively for T2; and 39.5 and 22.0 ºC, respectively for T3. Results showed that increase of temperature gave the same response to grain filling dispersion on each variety. Temperature treatment affected significantly on full grain at primary tip, weight of empty grain at secondary tip, the weight of 1 000 grains at secondary base, total empty grain and full grain at panicle tip. High temperature has tendency on the empty grain at primary tip, weight of full grain at secondary tip, weight of empty grain at secondary base and total full grain at primary tip.

Keywords: global warming, grain filling dispersion, grain weight,high tempeture

A-25 Productivity of Heirloom Rice Varieties in Rainfed Lowland Ecosystem: A Climate Change Adaptation Strategy

CANCELLED

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The research study evaluated the growth and yield performance of seven heirloom rice varieties planted under rainfed lowland ecosystem. It was conducted in Cabaruan, Maddela, Quirino from May 23, 2014 to October 25, 2014. The seven heirloom rice varieties served as treatments which were arranged in Randomized Complete Block Design replicated three times. The heirloom rice varieties responded differently under rainfed lowland ecosystem.
Agronomic parameters such as plant height at maturity exhibited significant differences in which varieties San Vicente and Palawan Red (V_6 and V_7) were the tallest. Black Rice (V_1) produced the most number of productive tillers. Longest panicle lengths were produced by El Princesa (V_5), Black Rice (V_1) and Palawan Red (V_7). The most number of filled grains per panicle, the heaviest grain yield per hill and per sampling area were obtained by El Princesa (V_5), San Vicente (V_6) and Black Rice (V_1). However, insignificant differences were observed in terms of weight per 1000 grains, indicating that all varieties used in the research study had the same size. The projected yield of Black Rice (V_1) obtained the highest yield with 3.75 metric tons per hectare followed by varieties, El Princesa (V_5) and San Vicente (V_6) produced 3.5 and 3.25 metric tons per hectare, respectively. The three upland cultivars had consistently registered excellent growth and yield performance across all varieties indicating the responsiveness under rainfed lowland ecosystem. In this research study, Black Rice (V_1), El Princesa (V_5) and San Vicente (V_6) offered a new approach in increasing the production of heirloom rice under rainfed lowland ecosystem using vermicompost/vermicast, vermi tea and other natural farming inputs..

Keywords: Climate change, Upland rice, Global warming, Nutrient management, water scarcity

A-26 Response of Indonesian Rice Cultivars Different in Submergence Tolerance to Various Fertilizer Applications at Several Submergence Treatments

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Swamp areas are potential land for rice production in Indonesia and South Sumatra is one of the dominant swamp land province. Cultivation of rice in swamp land is still constrained by uncontrolled water condition so that the rice plants often experience submergence stress during vegetative growth. Fertilizer application method is very important to improve rice plant growth that experienced submergence stress. Understanding the response of rice cultivars having different in submergence stress tolerance is also important to understand its response to submergence stress and fertilizer treatment. Three Indonesian rice cultivars (Inpara 3, Inpara 5, and IR 64) were examined their growth and yield characteristics under 7 days duration of submergence treatment at 7, 14 and (7 + 28) days after planting. Rice plants were submerged into water tank at 100 cm water depth and water level was kept to be constant so that plant parts could not appear from water surface during the treatments. Fertilizer application used consisted of Urea, Si and Zn. Results showed that submergence stresses that occur at earlier phase

and rice varieties that do not have sub-1 gene cause greater stress on the growth of the rice plant. Moreover, double submergence would provide higher impact on the plant. The proper combination of urea, silicate and zinc fertilizer would help to reduce the impact of submergence stress in rice plants. It was also found that Inpara 3 tended to have better response to grow and yield under submergence stress with the appropriate urea, Si and Zn application.

Keywords: fertilizer application, submergence stress, tolerance rice cultivars

A-27 Utilization of Microbes and Reduce Fertilizers to Improve Resistance and Yield Upland Rice

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Rice (*Oryza sativa* L.), is one of the most important food crops in Asia and Indonesia. Especially of local up land rice is important and contributes to consume by people in Southeast Sulawesi, Indonesia. However, attention of upland rice was stiil low compared to paddy rice. Several problems upland rice; like fertilizer, low yield and susceptible to pathogens. It is essential to improve the resistance to pathogens, to increase its yield potential, and to reduce chemical fertilizer use. This can be accomplished by the use of a mixture of microbes' i.e, trichoderma, rhizobacteria and mychoriza. The objectives of the experiment were to study the resistance of rice plants to disease, rice yield and to reduce the chemical fertilizer use for up land rice. This research used Completely Randomized Design in a split plot pattern consisting of two factors. The first factor was fertilizer dose, with two levels 75% and 50%, and the second factor was a mixture of microbes, consisting of four levels (Trichoderma sp. + Mycorhiza; Trichoderma sp +Rhizobacteria and Rhizobacteria + mychoriza). The results showed that the mixture of microbes siginificantly influenced the yield components of rice such as number and panicle length, number of tillers, and yield. The microbes significantly improved rice yield, compared to farmer's cultural method. The microbes could improve resistance of rice plants against the disease infected by leaf pathogens and generative phases. The microbe use reduced fertilizer usage for up to 25%. The study concluded that the mixture of microbes induced resistance, improved rice yield and reduced chemical fertilizer use. This implicates that the mixture of microbes improved the contribution of local up land rice to the total national rice production. This study needs to be continued at different field locations to get additional data to support the finding results

Keywords: Up land rice, resistance, yield microbes

A-28 Genetic Variability and Diversity in Drought and Yield Component Traits in Rice (Oryza sativa. L.)

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A total of 44 improved varieties in the genebank of Cuu Long Rice Research Institute (CLRRI), Vietnam, were used to clarify t heir diversity of drought tolerance using SSR markers. Whole of 73 loci were assigned to the 165 miscrosatellite primer pairs. A total of 378 alleles were detected among the 44 rice genotypes with an average of 5.12 alleles per locus. A dendrogram based on cluster analysis showed a significant genetic variation among the genetic distance ranged from 0 to 0.74. With genetic distan ce of 0.62, the cluster revealed three major groups of A, B and, C rice varieties. In the analysis of quantitative traits, the range o f the coefficients of variability was high. The variation was 99.4-209.8 seeds/panicle of filling grain, 4.6 to 62.3 % of unfilling grain. The highest value is the unfilling grain indicated that this character is much effected by environment and cultural manage ment practices of the farmer. The means of measurements of quantitative traits were higher (from 97-142 cm). The highest valu e concentrate in yield (4.0-8.6 ton/ha) and survival (21-30 days) show that these identified clusters could useful in the hybridiz ation program for rice.

Keywords: drought tolerance, genetic divergence, quantitative traits, rice, cluster

A-29 Improving Nitrogen and Water Use Efficiency in Contour-levee Rice System in Colombia

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Rice production has been increasing in Colombia in past few decades, and per capita rice consumption in the country is as high as 43 kg, approaching to that in Japan. The production cost in Colombia is, however, higher than that in US, mainly due to the higher cost of fertilizers. As the FTA with US will be effective in near future, it is imperative to reduce the input cost by increasing the resource utilization efficiency.
In the largest rice production area in the country, ie., alluvial fan of Ibague, the department of Tolima, rice is mainly produced by contour-levee irrigation system. The levees are formed by a special roller called "taipa" before sowing every cropping season, and non-till planter directly sow seeds into dry soils. Then field will be irrigated every 3-5 days depending on the soil texture.
It was initially hypothesized that the efficiency of the water/nitrogen use is lower due to this water management system. However, the preliminary data implied, (1) water loss to the deeper layer through percolation is minimal due to heavy clayey texture, and (2) nitrogen loss through surface runoff is also smaller than expected, judged from the N deficiency symptom at the N0 plot at the end of the slope.
The varietal improvement is also being tried in the research by introducing deeper rooting QTL to the Colombian leading varieties.

Keywords: rice, Colombia, nitrogen, water, resource use efficiency

A-30 Underutilized Indigenous Plants From Southern Tagalog Region of The Philippines With Potential Economic Uses

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The increasing interest towards healthy living led to the search for indigenous plants as possible sources of food and non-food products. The Southern Tagalog Region (Region IV) of the Philippines is a vast source of indigenous plants waiting to be discovered, others may have already been domesticated but mass production is unsustained due to the lack of technology and available knowledge.
Several species of indigenous plants with potential economic uses were collected from selected areas within Region IV. From the collection, five plants were selected for further research namely Balbas bakiro (*Momordica cochinchinensis*), Apulid (*Eleocharis dulcis)*, Lagikway (*Abelmoschus manihot)*, Canna (*Canna indica)* and Talinum (*Talinum fruticosum)*. Studies related to the utilization and promotion of these selected plants includes assessing of suitable propagation methods, creation of recommended field production technologies and promotion of developed products.
Three processed products have been produced and are currently being tested for food composition analysis and sensory evaluation.

Keywords: Philippines, Indigenous plant, Utilization, Promotion

A-31 Simulation of Corn Yield in Carmen North Cotabato, Philippines Using Aquacrop Model

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This general objective of the study was to apply the AquaCrop model to the conditions in the municipality of Carmen, North Cotabato in terms of predicting corn yields in this area and determine the influence of rainfall and soil depth on simulated yield. The study revealed wide disparity in monthly yields as a consequence of similarly varying monthly rainfall magnitudes. It also found out that simulated yield varies with the depth of soil, which in this case was clay loam, the predominant soil in the study area. The model was found to be easy to use even with limited data and shows a vast potential for various farming and policy applications, such as formulation of a cropping calendar.

Keywords: Aquacrop, Evapotranspiration, crop modelling, crop simulation

A-32 The Effect of Depths of Man-made Biopore on Soil Water Content, Growth, and Yield of Oil Palm in South Sumatera, Indonesia

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This study aims to study the influence of depths of man-made biopores on soil water availability and the responses of 12-year-old oil palm (*Elaeis guineesis* Jacq.) to altered water regimes in South Sumatera. The study was conducted from October 2014 to April 2015 at the Oil Palm Experimental Plantation, Faculty of Agriculture, Sriwijaya University, Inderalaya. Depths of the biopores were varied from 50, 100, 150, and 200 cm. Each sampled plant was provided with four biopores on the west-east and north-south directions. Soil texture in the research location is mostly sandy loam, infiltration rate varies from moderate to slow, and permeability is from moderately slow to very fast. Rainfalls were fluctuated during period of November 2014 to April 2015. The highest rainfall occurs in December at 395 mm spreaded in 20 days. Soil moisture at late dry season (October) at horizon A was 20.29% and horizon B was 24.11%. After 6 rainy months, greater variations of soil water content were observed at horizon B. They were 27.93% (control), 28.20% (for 50-cm-depth biopore), 29.18% (for 100-cm depth), 32.76% (for 150 cm) and 33.19% (for 200 cm). Plants treated with 100-cm-depth biopore exhibited more number of fronds, female flowers, and number fruit bunches compared to untreated plants. There were no significant difference in growth and yield components among plants treated with biopores depth between 100 to 200 cm during rainy season.
Key words : man-made biopore**,** Rainfalls, soil water, oil palm, sandy loam

Keywords: man-made biopore, Rainfalls, soil water, oil palm, sandy loam

A-33 Preliminary Studies on Black Rice: Basis for Development of Its Sustainable Production Technologies

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This is an offshoot of the first phase of a study on black rice which dealt on the determination of its performance under lowland rice culture. It was found that it could thrive and be productive on irrigated lowland condition. Findings paved the way to the second phase of the study which aims to develop sustainable production technologies specifically for black rice. This paper presents findings of the study conducted last dry season of 2015 as a prelude to the conduct of the second phase. It describes some of the growth and yield parameters that would be used as basis in designing and formulating appropriate technologies that would ensure sustainability of black rice.
Plant height at maturity was 32 cm. There were 32 productive tillers and two, unproductive. The mean number of grains per panicle was 128, and 115 of which were all filled. The length of panicles was 23 cm. The fifth internode was the longest, measuring 13 cm, while the shortest was the first internode, which measured four cm. The overall length of the culm was 42.50 cm. The length of roots was measured from the longest strands of the root system and found to be 23 cm long. The grain weight / hill was 76.8 g.
The same study is conducted this 2015 wet season and the same growth and yield parameters shall be measured. Data that would be generated from the two studies shall be used for the development of production technologies for black rice.

Keywords: black rice, sustainable production technology, lowland rice culture, growth parameters, yield parameters

A-34 The Environmental Characteristic Analysis for Effective Cultivation of Jatropha in Botswana As Semi Arid and Cold Area

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Jatropha has attracted big attention as biofuel plant in the arid area that does not compate with food production since about 2007. However Jatropha has drought resistant but low oil productivity under the dry condition. It takes long times to mature and it is necessary to much management in the meantime. In Botswana as semi-arid area, Jatropha seed production is inhibited due to severe water deficit and winter cold. Large fluctuation in the precipitation and temperature makes management of the cultivation difficult. Therefore, it is required to develop of the Jatropha cultivation method that adapts environmental changing damage from dry and cold weather. In particular, it is important to saving water management under this area as little water environment. In order to establish method of saving water management that adapted this severe climate, we have monitored and analyzed weather condition and soil moisture content. We clarified weather properties and time change in soil moisture content through cultivation period .

A-35 **The Quality attributes Measurement of Cocoa Beans in Several Regencies in South Sulawesi**

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The objective of the study was to measure the quality attributes of cocoa beans including level of broken beans, bean waste (foreign matter), moisture content, and cocoa grade (number of beans in 100 g) from Seven Regencies in South Sulawesi. Each regencies consist of 5 collector's storage, sample of cocoa was 2 kg per collector, separated between whole beans ,broken beans and bean waste, and then calculated their quality level. Moisture content calculated by Sartorius AG MA 40-000V2 series number: 70501045. The study indicates that quality attributes of cocoa beans had not yet met the standard set by Indonesian National Standard of Cocoa beans (SNI 01-2323-2002), except for the level of broken beans. Based on classes/categories of cocoa beans in SNI standard, due to the number of beans in 100 g bean weight, cocoa beans from Wajo, Bone and Sinjai included in class A, Soppeng and Polmas in class B, Luwu and Pinrang in class C.

Keywords: Cocoa beans, Quality attributes, Bean Waste, Moisture Content, Broken beans

A-36 **Kenaf Core Fibre As A Potential Renewable Soilless Growing Media**

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Kenaf (*Hibiscus cannabinus*) has many potential uses. The kenaf stems produce two type of fibres, bast and core fibres. The core fibre (CF) comprises 60-65% of the stem dry weight. This paper reports the results of our study on utilization of CF of different particle sizes (>3mm, 2-3 mm, 1-2 mm, <1mm) as growing media for production of an annual flower (*Celosia plumosa*). Differences in particle sizes of CF had different air-water relations, and markedly affected plant available water. CF with largest particle size (>3mm) drains more easily and held less water than any other sizes at a given pressure. CF with smaller particle size contained higher easily available water (EAW), increasing by 121.3% (from 6.1 to 13.5%) as the particle size reduced from 3 mm to < 1 mm. Air-filled porosity (AFP) which indicates aeration status of the media was reduced by 47.9% as the particle size of CF decreasing from >3 to <1 mm. Plants grown on 1-2 mm CF were the largest, as shown by their canopy diameter and flower length, following faster growth rates. Albeit low EAW, the results obtained here clearly showed that CF can potentially be used for a successful production of the crop. Utilization of CF as growing media offers an alternative use of kenaf and its utilization could contribute in reduction of negative impact of continuous peat harvesting.

Keywords: Kenaf core fibre, Growing media, Air-water relationship, Celosia plumose

A-37 **Change in Soil Chemical Properties and Microbial Activities Under Conservation Agriculture Compared With Conventional Tillage in Lowland Rice Agroecosystem in Cambodia**

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We investigated the impacts of conservation agriculture (CA) with no soil disturbance and cover crop biomass C-inputs compared with conventional tillage (CT) at different rice cropping sequences and fertilization rates on soil chemical properties and microbial activities under an ongoing experiment conducted on sandy podzolic soil located in Stung Chinit irrigation scheme, Cambodia. Soil samples for analysis were obtained from 0-5, 5-10, 10-20, and 20-40 cm depths of soil layer at the end of cropping system in 2014 after four year of cultivation. Soil chemical properties (i.e., soil organic carbon: SOC, total nitrogen: TN, and potassium permanganate oxidizable carbon: POXC) and microbial activities (i.e., soil respiration: SR and nitrogen mineralization: NM) were determined. CA significantly increased SOC, TN, POXC, SR, and NM at topsoil layer, while the concentrations were consistently lower in CA than under CT at subsoil layers. On average, SOC and TN contents at the top 0-5 cm on CA (80.5 and 8.4 Mg ha^{-1}, respectively) were greater than those under CT (48.0 and 4.7 Mg ha^{-1}, respectively). On average, POXC concentration at 0-10 cm was higher on CA than under CT with 433 and 345 mg kg^{-1}, respectively. Linking to SOC and TN, soil respiration and NM contents, on average, at top 0-10 cm were greater under CA (33 and 258 mg kg^{-1}, respectively) than under CT (29 and 219 mg kg^{-1}, respectively). Our research indicates that adoption of CA increases SOC content, enhances microbial activities, and therefore contributes to the sustainability of agriculture in the

ecosystem.

Keywords: conservation agriculture, soil organic carbon, potassium permanganate oxidizable carbon, soil respiration,nitrogen mineralization

A-38 Fruit Size Increase in 'Khai' Banana (Musa AA) by CPPU and GA3

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'Khai' banana is a famous banana grown in Thailand and South East Asia. Its fruit size is relatively small due to genetic background. Enlarging fruit size by external application of plant regulators probably results in total yield increase. This research aimed to investigate how CPPU (cytokinin) and GA_3 (forchlorfenuron, gibberellic acid) influence the banana fruit. 'Khai' banana grown locally in Petchaburi, Thailand was sprayed with CPPU (25 and 100 ppm), GA_3 (100 and 200 ppm) or water over the bunch when last hand emerged. The fruits were harvested at 5-6 weeks after flowering and then the fruit appearances were determined. The CPPU-treated bunch weighed 7.5 kg, which was heavier than the bunch in the control treatment (5.2 kg). The weight of the 2nd hand was 1.8 kg for CPPU-treatments, 1.5 kg for GA_3 treatments and 1.3 for the control. The fruit weight increased 20-60% when applied with GA_3 and CPPU, but fruit number was similar in all treatments. Compared to the control, fruits applied with GA_3 and CPPU were markedly increased in fruit length (17-25%), fruit circumference (7-17%) and peel thickness (17-35%). Ripening duration of the CPPU-treated fruit was 2-3 days longer than those of the control. Pulp total soluble solids was 27% and 15-18% in the control and CPPU-treated fruit, respectively. The ability of CPPU in promoting fruit size enlargement of 'Khai' banana suggests that CPPU is potentially useful for yield increasing. The fruit firmness and total soluble solids were slightly different probably resulted from delay ripening.

Keywords: Pisang Mas, forchlorfenuron, plant regulator, fruit enlargement

A-39 Study on Vine Propagation for Seed Tuber Production of Water Yam (*Dioscorea alata* L.)

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Yam (*Dioscorea* spp.) is major staple food in West Africa, South Pacific islands or Caribbean islands, while in Japan or Southeast Asia yam is popular as a vegetable or processed foods. Planting materials of yam uses tuber setts or whole tubers. But, the cost of them is high and multiplication rate is quite low compared with cereals. In case of increased demand of new variety for food production or breeding, rapid and mass propagation method is essentially needed. Vine propagation is one of potential propagation methods.

Three experiments were carried out at university's farm in Miyako, Okinawa, Japan from 2013 to 2015. In Experiment 1, performance of vine propagation was examined using 80 varieties of water yam (*D. alata*). Mean survival rate and shoot formation rate in all varieties was 89.6% and 52.8% respectively. Soot formation rate, growth of top and size of new tubers varied among varieties and some varieties formed larger new tubers. In Experiment 2, different types of medium were examined. Vine propagation carried out under long day length and short day-length. In different mediums, survival rate was almost similar among different mediums. Under short day length condition, new shoots almost were not formed on vine cutting. In Experiment 3, mechanized seed tuber production using vine propagation was validated. Major procedure had done by machines. Vine cuttings were planted in biodegradable paper pots in July. Harvested mini tubers were about 4 g and maximum was about 19 g. Mechanized vine propagation is feasible for seed tuber production.

Keywords: Mechanized yam seed tuber production, Medium for vine cutting, Season of vine cutting, Varieties

A-40 Effects of Different Greenhouse on Transplanting Succession and Growth of Banana Plantlets at Pakchong Research Station, Thailand

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Appropriate greenhouse for commercial banana plants production was conducted, at Pakchong Research Station, Nakhonratchasima, Thailand during June-September, 2015. Plants material from tissue culture were transplanted into soil mixture then transferred to nylon net greenhouse (1) or plastic roof greenhouse (2) with 50% shading. The experimental design was Completely Randomized Design (CRD) 2 treatments, 20 replications and 5 plants /replication. At the last week, the percentage of survival rate of bananas was 91% in greenhouse (2) whereas 79% in greenhouse (1). The average plant height in greenhouse (1) was higher than greenhouse (2) but the circumference average was bigger in greenhouse (2) 4.88 mm. Banana plants in greenhouse (2) was also performed leaf number more than another greenhouse. It was highly significant between both greenhouse in circumference and leaf number but non- significant in plant height and survival rate. When compared the cost production of banana plants between 2 greenhouse, it revealed that plastic roof greenhouse was recommended for commercial banana plants production.

Keywords: plant production, greenhouse, banana, commercial, survival

A-41 Comparative Analysis of The Antioxidant Property and Biopigment Production of Monascus Purpureus Using Taro (*Colocasia esculenta* L Schott) and Tannia (*Xanthosoma sagittifolium* (l.) Schott Cv As Substrates

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The growing demand for healthier food alternatives has given rise to extensive studies of pigment-producing microorganisms, s uch as the pigment-producing fungus *Monascus purpureus*. *M. purpureus* produces a biopigment whose color is made possible by several proteins: monascin and angkaflavin, responsible for the yellow pigment; monascorubrin and rubropuntatin, for the or ange pigment; and monascorubramine and rubropuntatine for the red pigment. Here, we determine and compare pigment produ ction by *M. purpureus* using taro and tannia as effective alternative substrates to rice, which is used as control. Using establishe d procedures, we extracted *Monascus* biopigments produced from the three substrates and compared their concentration and ant ioxidant activities. Results show that the red and orange pigments produced from taro have closer absorbances to those produce d from rice. However, they were less distinct than those produced from tannia, implying that biopigment from tannia is a more effective colorant than that from taro. Results also show that pigments extracted from taro and tannia had higher percent scaven ging activities than those extracted from rice, implying that taro and tannia are better antioxidant sources than rice. Moreover, t he pigment produced by *M. purpureus* using taro as substrate showed a closer similarity to that produced using rice. From the r esults obtained, it was concluded that both taro and tannia can be good alternatives to rice as substrate for biopigment productio n by *M. purpureus*.

Keywords: Monascus, purpureus, tannia, taro, biopigment

A-42 Morphogenetic Characteristics of Traditional Upland Rice Cultivars in Arakan Valley, Cotabato, Philippines

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Morphogenetic characteristics of fourteen traditional upland rice of Arakan Valley, Cotabato, Philippines were evaluated as important information in improving upland rice production and identify desirable germplasm for future breeding purposes.
Upland rice cultivars differ in seed shape, size, color, aroma and presence of awn (others awnless). Locally grown *Azucena* and *Bungulan* have translucent caryopsis, medium to longer grain (10-12 mm), and aromatic. *Dinorado* have pinkish to purplish aromatic caryopsis, and medium grain (6-8 mm). *Mubpon* has round shape and semi-aromatic. Most upland rice cultivars are medium to tall, produced few tillers and panicles, and mostly have longer days to flower. *Kawilan* produced the greatest number of tillers (>5) and *Malundiang* flowered early while *Magalitok* got the longest panicle among the upland rice cultivars studied.

There were 24 SSRs (80%) that showed polymorphic bands in the genetic characterization of upland rice. A total of 63 alleles were identified and number of amplified fragments (alleles) ranged from 2 to 5 with an average value of 2.63 per

locus . The polymorphic information content (PIC) values of the primers ranged from 0.241 to 0.571 with an average of 0.387. Unweighted Pair Group Method with Arithmetic Averages (UPGMA) cluster analysis reveals a similarity coefficient range of 0 to 0. 5 indicating nil to moderate level of genetic similarity. *Malundiang*, *Ulipapa, Mubpon, Mal-os* and *Dabao* have 30 to 50% associated genes and apparently desirable based on its phenotypic characteristics (early maturing and high yield potential). *Bungulan, Azucena*, *Sinulid* and *Kawilan* differ genotypically with desirable agro-morphological characteristics like aromatic and bigger caryopsis, greater number of tillers and longer panicles produced.

Keywords: Morphogenetic, Traditional upland rice, Arakan Valley, phenotype, genotype

A-43 Estimation of Genetic Diversity among Tropical forage Corn Inbred Lines Using Molecular Markers and Agronomic Traits for Hybrid Production

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Corn (*Zea mays* L.) is one of the world's high value crops and the leading cereal crops together with rice and wheat. Corn is widely consumed as human food, animal feed and also being processed into industrial products and biofuel. Due to its high quality and nutritive value, corn biomass is now used as animal forage in the form of silage. In Malaysia, there is still lack of corn varieties specifically bred for forage production. The objectives of this study were to investigate the molecular variation among corn inbred lines using simple sequence repeat (SSR) DNA markers and to evaluate and investigate the agronomic variation of potential parental corn inbred lines for forage utilisation towards hybrid production. For this purpose, 19 homozygous inbred lines were selected and screened with 100 SSR markers. Five hundred and forty seven polymorphic alleles were detected among the inbred lines using SSR markers. Number of allelic richness per locus was in the range of 2 to 11 loci, with an average of 4.88 alleles per locus. Polymorphic information content (PIC) value among 100 loci ranged from 0.231 to 0.871, with a mean value of 0.610. It shows that the SSR markers used in this study were informative and able to reveal the genetic diversity among the inbred lines evaluated. Agronomic evaluation of the inbred lines revealed a wide range of variation for important forage traits, indicating high level of genetic diversity among the inbred lines. Based on the two dendrograms obtained from molecular and agronomic data, four distinct clusters were identified among the inbred lines. This indicates that the loci amplified have significant correlations with important forage traits which can be used in future QTL studies. Six inbred lines were selected as potential parents for hybrid production based on their agronomic and molecular diversity estimations. These inbred lines were found to be superior and diverse for important forage traits such as plant and leaf yields, plant height and crude protein content. It is expected that crosses among these inbred lines would produce promising superior hybrid varieties for forage production.

Keywords: Corn, Genetic diversity, Inbred lines, SSR markers, Agronomic traits

A-44 Characterization, Evaluation and Diversity and Cluster Analyses of Eighteen Varieties of Pole Snap Beans in La Trinidad, Benguet, Philippines

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Snap bean (*Phaseolus vulgaris*) is one of the most important legumes in the Philippines. The study aimed to characterize and evaluate the 18 pole snap bean varieties and determine their genetic diversity through diversity and cluster analyses. All the pole snap bean varieties characterized exhibited variation in 18 qualitative characters considered except for seed shape. The 18 varieties also differed significantly in 20 quantitative characters measured except for terminal leaflet length. BVC 8523, Kapangan, Tublay and Tuba were the top performers among the varieties evaluated.

The diversity indices for 18 qualitative characters of pole snap beans ranged from H`= 0.00 (seed shape) to H`= 0.41(seed color) with mean diversity of H`= 0.23. There were eight qualitative characters that exhibited high variation since their diversity indices exceeded the mean diversity index of 0.23. Low variations were noted on the other eight qualitative characters observed. Higher variations in 18 quantitative characters were exemplified by the pole snap bean varieties evaluated. Nine quantitative characters measured had higher diversity indices exceeding the mean diversity index of H`= 0.48. Four characters had equivalent diversity indices with the mean diversity index for quantitative characters. The other five characters had lower diversity.

Cluster analysis identified seven clusters among the 18 varieties evaluated based on 20 quantitative characters measured. Each cluster of varieties possessed distinct characters indicating that they could be used as commercial variety or serve as parent in varietal improvement program as source of genes to develop new improved varieties of pole snap beans.

Keywords: Phaseolus vulgaris, Qualitative, Quantitative, Variation, Genetic Diversity

A-45 Diversity of Malaysian Lentinus Fr. and Chemical Analysis of Antioxidative Extract From Mycelia of Lentinus Squarrosulus Mont.

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Seventy-eight collections assigned to ten *Lentinus* species in Peninsular Malaysia namely *Lentinus badius, L. fasciatus, L. conatus, L. polychrous, L. sajor-caju, L. similis, L. squarrosulus, L. strigosus, L. tigrinus* and *L. velutinus* were recorded in this study. *Lentinus squarrosulus* was commonly encountered during the survey (April 2003-June 2008). *Lentinus fasciatus* was documented as a new record in Malaysia. The status of edibility and medicinal value of some *Lentinus* species has been reported by many researchers however, there are limited studies on this mushroom from mycelial culture. Thus, this study aims to evaluate the antioxidant capacity of mycelial *Lentinus* in Malaysia. Five selected *Lentinus* species were successfully cultured i.e., *Lentinus fasciatus, L. polychrous, L. sajor-caju, L. squarrosulus* and *L. strigosus*. Preliminary study on antioxidant activities for these species was performed using Folin-Ciocalteu assay, scavenging effects on 1,1-diphenyl-2-picrylhydrazyl (DPPH) radicals, ß-carotene-linoleate bleaching assay, cupric ion reducing antioxidant capacity (CUPRAC), reducing power assay and lipid peroxidation assay. The present study indicated that methanolic mycelial extract of *L. squarrosulus* (LsqMeOH) showed stronger antioxidant capacities as compared to other extracts. CUPRAC-guided purification was performed on LsqMeOH by using thin layer chromatography (TLC) and reversed phase-high performance liquid chromatography (RP-HPLC). The chemical constituents of the most potential extract were effectively identified by LC-MS/MS. Ganoderic acid derivatives, uridine and flavonoid were identified for the first time in *L. squarrosulus* antioxidative fractions. Therefore, this research suggested the potentials of *L. squarrosulus* as a source of antioxidant extract to be used either in food industries or cosmetic products.

Keywords: Mushrooms, Mycelia, Antioxidant, Lentinus, LC-MS/MS

A-46 Different Root Anatomical Changes in Salt Tolerant- and Salt Sensitive Foxtail Millet (setaria Italica L. Beauv) Genotypes

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Foxtail millet is a potential crop to be grown in the areas where high salinity levels prevent crop production. The objective of this study was to identify anatomical changes in the roots of foxtail millet genotypes with different tolerance level to salt stress. Four foxtail millet genotypes, namely ICERI-5 and ICERI-6 (salt tolerant) and ICERI-4 and ICERI-10 (salt sensitive), were grown hydroponically for 1 week prior to 60 and 120 mM salt stress application. Root anatomical changes were observed on the fifth day after salt stress treatments. Our results showed that salt stress significantly induced some anatomical changes in the roots of foxtail millet genotypes, i.e. increased epidermis and cortex thickness, increased root diameter, and increased the number of root hairs. Salt stresses applied were not significantly affected the stele diameter and the number of metaxylem. The increase in epidermis thickness, root diameter and the number of root hairs due to the salt application were more pronounced in the sensitive genotypes. While salt stress induced a significant increase in the number of protoxylem in the tolerant genotypes, it significantly decreased the number of protoxylem in the sensitive genotypes. The different anatomical changes under salt stress between the tolerant- and sensitive genotypes indicate that some anatomical attributes of the roots might determine the salt tolerance level of foxtail millet.

Keywords: foxtail millet, salinity, root anatomy, protoxylem, root hair

A-47 Genetic Diversity of Zombi Pea, an Understilized Legume, Assessed by 11 SSR Markers

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Zombi Pea (*Vigna vexillata*) is an underutilised legume crops. It is a gene sources for resistance to several biotic and abiotic stresses with a very little understanding on its genetic diversity and structure. In this study, 402 (7 cultivated and 395 wild) accessions of zombi pea from diverse origins (185 from Africa, 120 from America, 88 from Australia, 4 from Asia and 5 unknown origin) were analyzed with 11 simple sequence repeat (SSR) markers for genetic diversity using to determine its genetic diversity and structure. The SSR markers detected 152 alleles in total with a mean of 12.67 alleles per locus. PIC values

varied from 0.53 (CEDG043) to 0.90 (CEDG181) with an average of 0.77. Allelic richness was highest in Africa (39.77) and lowest America (22.21) with an average value of 31.31, respectively. Gene diversity was greatest in Africa (0.73) and lowest in America (0.34) with an average of 0.60. Nei's genetic distance analysis revealed that the highest distance was between Africa and Asia (0.58), followed by Africa and America (0.33), and Africa and Australia (0.30), respectively. STRUCTURE, neighbor-joining (NJ), and principal coordinate analyses revealed that the 402 zombi pea accessions were mainly distinguished into 3 groups, viz. America, Africa and Asia, and Australia. A phylogenic tree generated from NJ analysis also suggested that American and Australian zombi peas were both originated from African zombi peas, but from different regions, and that cultivated zombi peas from Asia, Africa and America were genetically distinct. These results suggest that Africa is the center of origin and diversity of zombi pea.

Keywords: Vigna vexillata, Zombi pea, Genetic Diversity, Structure, SSR marker

A-48 Performance of Red Onion (Bulb Type) in Fully Converted Organic Area as Affected by Frequency of Organic Fertilizer Application Combined With Trichoderma Spp.

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The study was conducted to determine the viability of producing organic onion under fully converted area. Specifically, the study aims a) to establish the frequency of organic fertilizer and *Trichoderma* spp. application, employing split application; and b) determine the yield performance of onion. The research was conducted for two consecutive dry seasons (2014 and 2015). Red variety was used with the following treatments: Treatment 1- organic fertilizer alone (8t/ha); Treatment 2- organic fertilizer (8t/ha) applied twice (basal and at 30 DAT); Treatment 3- organic fertilizer (8t/ha) applied twice (basal and at 30 DAT) + T*richoderma* spp. at the rate of 526 kg/ha applied at planting; Treatment 4- organic fertilizer at recommended rate + *Trichoderma* spp. at the rate of 526 kg/ha, both applied twice (at planting and at 30 DAT); and Treatment 5- organic fertilizer at recommended rate applied at planting and at 30 DAT + *Trichoderma* spp. at the rate of 526 kg/ha applied thrice (at planting, 30 DAT and during bulb formation). Results of the study showed that application of the recommended rate of organic fertilizer at planting and at 30 DAT plus the three times application of *Trichoderma* spp. (at planting, 30 DAT and during bulb formation) consistently produced bigger bulb during the first and second trial of the study compared to other treatments evaluated. Consequently, higher marketable yield was produced with 15.33 t/ha during the first trial and 14.50 t/ha on the second trial.

Keywords: organic onion, Trichoderma spp, organic fertilizer, split application

A-49 Integrated Crop Management Adoption for Production and Postharvest Quality in Mango (Philippine 'Carabao' Var.)

CANCELLED

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Mango has been one of the leading export products in the Philippines. Providing with developing technologies for the production of mango made competitiveness to other producing countries. The objective of this work was to evaluate the influence of integrated crop management (ICM)/integrated pest management (IPM) in the productivity and postharvest quality of mango through grower clustering strategy.
Two clusters composed of 10 growers per site were organized. Baseline information of production practices was gathered and ICM/IPM were implemented in each cluster member and monitored regularly for three years. Among the technologies followed by the growers are pruning, use of paclobutrazol as soil drench, nutrient management, use of paper bags to cover the fruit and monitoring pests for pesticide application. Hot water treatment against postharvest diseases was also demonstrated.
Results revealed that the level of insect pests and disease occurrence were influenced by extend of crop management technologies followed by the growers. Likewise, the fruit yield was increased, quality profile of fruits were improved and postharvest losses due to diseases were reduced, hence growers much be encouraged that these technologies must be properly implemented to sustain supply-base of quality and safe mangoes for domestic and export markets and ultimately increased profit in the region.

Keywords: integrated cropt management, cluster, technologies, domestic, export market

A-50 Technology Needs for Small Organic Farmers in the Philippines

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A study was conducted from February to April, 2012 in the province of Camarines Sur, Philippines, primarily to determine the technology needs of organic adopters including women farmers to improve the compliance to the Philippine National Standard on organic agriculture. The study's specific objectives were: a) to determine the practices of farmers in the organic production of rice, vegetables, chicken and swine, and organic fertilizers; b) to determine the gender participation, issues and problems in organic farming met by adaptors and their coping mechanisms; and c) to recommend specific actions to overcome identified gaps and needs in the adoption of organic farming technologies. Primary and secondary data gathering, key informant interviews and focus group discussions were conducted from people, organizations and groups known to practice organic farming.
For crop production, access to sustainable supply of organic fertilizers and seeds, and pest control methods was found limiting. Likewise, village level or common service facilities were identified needs to lessen cost of production and postharvest, and to increase access to markets for rice and vegetable. For animal production, technologies are desired for preparation of high quality organic feeds, feeding system, and availability of appropriate animal stocks for integration in organic farming system. For organic fertilizer production, more women-friendly technologies, tools and equipment are needed. Likewise, technologies to produce local organic fertilizers with desired nutrient contents suited for specific crops are wanting.

Keywords: technology needs organic agriculture Philippines, organic farming needs, gender participation

A-51 Growth and Yield Response of Tomato (*Lycopersecum esculentum*) 'Diamante' Variety on Different forms of Fermented Golden Apple Snail (*Pomacea canaliculata*) Organic Fertilizer Application

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This study was conducted to evaluate the effect of different forms of fermented golden apple snail as organic fertilizer on the growth and yield of tomato. This experiment following the Analysis of Variance in Randomized Complete Block Design was conducted at Barangay Camburay, San Jose, Occidental Mindoro from May 2014 to August 2014.
One hundred eighty (180) seedlings of tomato were used in the study. Thirty plants were randomly distributed for each treatment of ten plants per replication. All the plants were subjected to same care and management except for the amount of fermented golden apple snail organic fertilizer. Treatment 1 (Control), Treatment 2 (25 g 14-14-14 complete fertilizer), Treatment 3 (250 g FGAS, solid form basal fertilizer), Treatment 4 (250 mL FGAS, liquid form fertilizer as fertigation), Treatment 5 (250 mL FGAS, liquid form fertilizer as spray) and Treatment 6 (250 mL FGAS, combination of liquid form as fertigation and spray/foliar fertilizer).
Based from the findings, the use of 250 g solid form of fermented golden apple snail organic fertilizer produced the best growth and yield performance of the plant in terms weight of fruits, number of fruits, diameter of fruits, and weight of roots.
It is therefore recommended the use of solid form fermented golden apple snail organic fertilizer in the production of tomato and the other crops.

Keywords: fermented golden apple snail, tomato

A-52 Allelopathic Effect of Tinospora Tuberculata Leaf on Growth of Weeds in Rice Field

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Allelopathic potential of powder and methanol extract of *Tinospora tuberculata* leaf as pre-emergence and post-emergence (foliar spray at 14 days after sowing) applications on the germination and of three common rice field weeds (barnyardgrass, smallflower umbrella sedge and weedy rice) were evaluated under glasshouse condition. Three concentrations of leaf powder and leaf extract (1, 2, 4 t ha^{-1} and 1000, 2000, 4000 L ha^{-1}, respectively) were compared with the control. The magnitude of the allelopathic effects was dependent on the application methods (powder and extract), time of application (pre and post emergence), the concentration and the recipient species. The leaf powder was found to have greater suppressive property than the leaf extract. The findings also recorded much more inhibition in application of leaf extract as pre-emergence relative to the post emergence application (foliar spray). In the field experiment, the germination and biomass of the emerged weed plants were remarkably reduced in the plots receiving leaf powder treatment. There was no significant difference between the leaf

powder applied plots (at 2 and 4 t ha^{-1} doses) and those plots that received herbicidal treatment (Pretilachlor) in terms of reduction percentage of both parameters (the emergence and dry matter of weeds). There was a significant promotion on grain yield, straw dry weight and number of seed per panicle of transplanted rice, when treated with leaf powders and chemical herbicide compared with negative control. These results suggest that *T. tuberculata* could be used as a potential natural pre-emergent herbicide for weed control in rice fields.

A-53 Poultry Waste Management by Using Vermicomposting Technology Amended With Different Agricultural Residues

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Poultry waste has greatly increased environmental concerns over nuisance odors and the potential for water pollution from excessive land application. Vermicomposting technology has been one of sustainable solution for waste management. However, the limitation of using poultry waste in vermicomposting due to its high ammonia content, high bulk density and auto heating capacity are concerned. Therefore, poultry waste management using vermicomposting amended with different agricultural residues was studied. The uses of different agricultural residues (cassava waste, cassava peel, eucalyptus bark and oil palm residue) amended with chicken manure in vermicomposting process were conducted. Nutrient element and heavy metal content in vermicompost produced were evaluated by comparing with different agro-industrial waste as amended materials. The results found that the earthworm could survive 100% as the ratio of chicken manure at 25% together with cassava waste, cassava peel and eucalyptus bark. When using the chicken manure and agro-industrial waste, it revealed that the growth of earthworm in terms of their weigh was highest in vermicomposting using the chicken manure at the ratio of 2.5%, 5% and 10% with the cassava peel, cassava waste, and eucalyptus bark, respectively. Using the oil palm residue, eucalyptus barks, cassava waste and cassava peel mixed with chicken manure at the ratio of 2.5%-10%, the eggs and embryos of earthworm were highly increased significantly different ($p \leq 0.05$).
The higher nutrient element i.e. N, P, and K content in vermicompost was found. Heavy metal, i.e. Chromium (Cr), Cadmium (Cd), Lead (Pb), Arsenic (As) and Copper (Cu) content in vermicompost from all vermibeds were decreased after vermicomposting process. Thus, using vermicomposting with different agricultural residues to manage poultry waste is a potential tool for agricultural waste management with ecologically sound and economically viable for sustainable agriculture.

Keywords: bio fertilizer, waste management, earthworm, agro industry, environmental friendly

A-54 Biodiversity of Insect in *Ficus Carica* Linn, Fig Farm

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Fig, *Ficus carica* is a new potential species of commercial plant that has been brought to Malaysia from western Asia such as United Arab Emirates (UAE). Belonging to the family of Moracea (mulberries);the only fig species that have been cultivated for large scale plantation are *F. carica* and *Ficus sycamorus* (sycamore fig of Egypt). Currently, fig cultivation in Malaysia is still in the research level before it can be planted in large scale. Therefore, any information related to insect biodiversity in fig farm in Malaysia may be helpful to produce commercial fig fruits. This study was conducted to observe the insect biodiversity in fig farm and the sampling was done in two plots; open area (OA) and glasshouse (GH) located in a fig farm in Department of Agriculture, Selangor. Each plot were divided into three subplots respectively (OA1, OA2, OA3, GH1, GH2, GH3) and two different traps; yellow-pan trap and yellow-sticky trap were set randomly in each subplot. Sampling was done on weekly interval for five weeks.Collected insect samples were identified to the family level using taxonomic keys from Borror and DeLong (2005). In addition, the analysis for diversity index was performed using BIO-DAP program (Biodiversity Data Analysis Package) and Shannon-Weinner Index was used to indicate the species biodiversity and species evenness found in each plot. A total of 341 individual insects composed of 25 species were collected throughout the sampling process. The highest number of individual in OA was represented by *Chrysomia megachepala* (81) meanwhile *Idioscopus nitidulus* was the dominant species in GH with a total of 20 individuals. The diversity index (H') in OA is higher compared to GH with 2.48 and 2.16, respectively. Besides that, Evenness index (E) showed that both plots have the same values of 0.8, respectively. This study provides us an insight into the common insect pest that can be associated with the fig trees planted under the influence of Malaysian environment and climate. Knowledge on the pest species and its diversity indices can be further applied in setting up preventive measures for pest control in future large scale commercial plantations.

Keywords: Ficus carica, Insect, Biodiversity

A-55 Spinosad Resistance Selected in Field Collected Population of Diamondback Moth in Selangor, Malaysia

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A field strain of diamondback moth (DBM), *Plutela xylostella* was collected from an organic farm in Semenyih, Selangor, Malaysia. The population was reared in glasshouse in UPM Serdang and selected with spinosad until 13th generation (G13). After continuous selection, the population developed resistance to the insecticide, represent by value of LC_{50}. At G13, LC_{50} for the population is 125.42 ppm as compared to 11.5 ppm of parent (P) generation (Resistance ratio, RR = 10.91). Resistance ratio as well as LC_{50} was gradually increased at every generations with no significant differences among the generations. The finding suggested that DBM can develop resistance to spinosad in a short time. Therefore, application of spinosad to DBM in agriculture field must be used with precautions in order to delay resistance of the insect to the insecticide.

Keywords: Diamondback moth, Spinosad, Resistance

A-56 Community Characteristics and Potential of Egg Parasitoids As A Biological Control Agents of Yellow Rice Stem Borer, Schirpophaga Incertulas Walker {lepidoptera: Pyralidae} in Bali of Indonesia

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Yellow rice stem borer is an endemic pest become a major pest of rice crops in Indonesia. The parasitoids group, especially egg parasitoids have an important role in regulating populations of yellow rice stem borer in the field since four weeks after planting, In general, this study aimed to analize the existance of egg parasitoids as major component of the pest control in rice field. Special aims of this study were to (1) analize the characteristics of the egg parasitoids community, (2) describe the succession pattern and parasitization level of egg parasitoids in utilizing the host in rice field, and (3) analize the functional response of the egg parasitoids to the host density. Research points 1 and 2 were conducted in the field (Jemberana, Tabanan and Badung Regencies) using survey method, while research points 3 was conducted in Integrated Pest management laboratory (Faculty of Agriculture, Udayana University, Denpasar, Bali) using a randomized block design with five treatments and 10 replicates. The results showed that the characteristics of the egg parasitoids community of yellow rice stem borer had low diversity index with very high similirity index consisted of three species, namely *Tetratichus schonobii, Telenomus rowani* and *Trichogramma japonicum.* The three species of egg parasitoids were dominated by *T.schonobii* with a very high population abundance since the plants were 2 to 6 weeks after planting. Then, the population declined and was replaced by *T. rowani* and *T. japonicum.* The three species of egg parasitoids had been found in rice crops since 2 weeks after planting dominated by *T. schonobii* on vegetative phase, while both *T. rowani* and *T. japonicum* were in generative phase. Those egg parasitoids also had functional response (type-2) to the host population density. Therefore, those egg parasitoids is very potential to be developed as a biological control agent of yellow rice stem borer in Bali.

Keywords: COMMUNITY CHARACTERISTICS, FUNCTIONAL RESPONSE, EGG PARASITOIDS OF YELLOW RICE STEM BORER

A-57 Suitability Test of Parasitoid Anagyrus Lopezi De Santis (hymenoptera: Encyrtidae) on Mealybug Species Associated With Cassava (*Manihot esculenta* Crantz)

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The parasitoid *Anagyrus lopezi* De Santis (Hymenoptera: Encyrtidae) was recently introduced from Thailand into Indonesia in early 2014, as an attempt to control a new exotic cassava mealybug *Phenacoccus manihoti* Matile-Ferrero (Hemiptera: Pseudococcidae). To determine its potential uses and effect on non-target species, behavioural observation of the parasitoids were made on four species of mealybugs, i.e. *P. manihoti*, *Paracoccus marginatus* Williams-Granara de Willink, *Pseudococcus jackbeardsleyi* Gimpel-Miller, and *Ferrisia virgata* Cockerell (Hemiptera: Psedococcidae). These mealybugs are very common attacking cassava in Indonesia. For that purposes, a set of tests was conducted in the laboratory wich includes susceptibility (no-choice test), preference (paired choice test), and suitability. For susceptibility test, parasitoid *A. lopezi* encounterend *P. manihoti* more often (13.70 ± 7.18) as compared to *P. marginatus* (9.85 ± 10.24), *P. jackbeardsleyi* (6.60 ± 3.62), and *F. virgata* (5.75 ± 4.09). Ovipositor probing occurred more on *P. manihoti* (8.20 ± 5.68) than on *P. marginatus* (0.70 ± 1.84), *P. jackbeardsleyi* (0.35 ± 0.68), and *F. virgata* (0.10 ± 0.45). For preference test, host encounter and ovipositor probing

by the parasitoid were more common on *P. manihoti* as opposed to other mealybug species. Out of four mealybug species tested, *P. manihoti* was the only suitable host for parasitoid development, with the number of progenies emerged 7.40 ± 2.17 individuals. Host specificity exhibited by parasitoid *A. lopezi* may prevent adverse effect to other mealybug species inhabiting cassava fields.

Keywords: host encountered, ovipositor probing, parasitized, Phenacoccus manihoti, Paracoccus marginatus

A-58 The Study on Genetic Diversity of Earthworm from Different Habitat by Coi Gene

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The CO I gene was used to study the genetic diversity of the different natural habitats of earthworm in Kasetsart University, Kamphaeng Saen Campus (KU-KPS) and commercial breed. The earthworms at Kamphaeng Saen Campus were collected from different 4 types of the natural habitats there are: under banana tree, under organic matter, near river bank and under grassland. In this study found that the genetic distance between earthworms from under banana tree and under organic matter has the lowest (0.057) and the earthworm at KU-KPS was far from commercial breed (0.247 – 0.267). Earthworm in Kamphaeng Saen was compared with the previous reported from China Taiwan and Spain. The results show that earthworm from Kampahaeng Saen and from China and Taiwan was more close than when compared with from Spain and the commercial. In addition, earthworm in Kamphaeng Saen was more similar with earthworm in Nakhon Ratchasima province, Thailand (92-100%).

Keywords: Earthworm, COI gene, Genetic diversity of earthworm

A-59 Study on Efficacy of Nutmeg Essential Oil (Myristica fragans Houtt) as an Attractant and Botanical Insectiside of Fruit Fly (Bactrocera dorsalis Complex)

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The fruit fly is a major pest of fruit plants in Bali of Indonesia. Crop damage by pests that can reach 90-100 percent if no action is taken control. Research on the efficacy of essential oils of nutmeg (NEO) (*Myristica fragans* Houtt) as attractant and botanical insecticide of fruit fly (*Bactrocera dorsalis* Complex) aims to determine consentrasi optimum, the active period of each concentration attract and kill fruit flies were trapped in the field. This study uses a randomized block design with four treatments of concentration namely 100%, 75%, 50% and 25% with ten replicates. The results showed that the four NEO concentrations tested is able to attract and trap flies sump in the field. NEO concentration treatment was highly significant (P> 0.01) in the appeal against fruit flies in the field. NEO concentration treatment is also significant (P> 0.05) to the time of death of 100 percent of the fruit fly trapped. Fourth concentration tested of NEO is able to attract and deadly fruit flies caught in a trap. The most effective concentration of fruit fly traps are is 100% (12.8 males trapped per day), followed by 75% (7.4 males trapped per day), 50% (4.3 males trapped per day) and 25% (1.8 males trapped per day). The concentration treatment is still effective to attract fruit flies until day 43. The effectiveness of each concentration to kill 100% (LT_{100}) of the population of fruit flies trapped were: 82.0 seconds to a concentration of 100%, 136 seconds to a concentration of 75%, 159 seconds to a concentration of 50% and 236 seconds to a concentration of 25%, respectively. There are three types of fruit flies attracted and trapped in a field that was *B. carambolae*, *B. papayae*, and *B. umbrosa*. Of the three types of fruit flies it, *B. carambolae* was the most abundant species attracted and trapped in the field.

Key words: efficacy, nutmeg essential oil, attractant, botanical insecticides, fruit flies

A-60 The Control of Clubroot Disease Caused by *Plasmodiophora Brassicae* Wor. on Cabbage (*Brassica oleracea* L. Var. Capitata L.) Using Some Plant Extracts

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Various pathogens are able to suppress the growth of cabbage. One pathogen that attacks the cabbage is *Plasmodiophora brassicae* Wor. which causes clubroot disease. Some efforts have been applied to control the disease including the use of synthetic fungicides. However, this method has not succeeded yet and it is also harmful to environment. Therefore, it is

necessary to develop natural fungicide from plant extracts that contain fungicidal compounds. The aim of this study was to determine the effectiveness of the plant extracts to control the disease. The experiment was designed as completely randomized design (CRD) with eight treatments i.e. leaf extracts of clove, gliricidia, neem, lemon grass, betel, sour sop, and siam weed, with four times replication. gliricidia extract was the most effective extract to control the clubroot disease and was able to promote the plant growth as well. The gliricidia extract resulted the lowest number of clubroot, the lowest percentage of pathogen attacks, the highest plant dry weight, the lowest root dry weight, the greatest plant height, and the greatest number of cabbage leaves.

Keywords: cabbage, clubroot disease, plant extract

A-61 Mapping of Bacterial Wilt Population in Potato Growing Areas in Benguet and Mountain Province: An Important Facet in Seed Production

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Benguet and Mountain Province (800-260 m. a.s.l.) are the oldest , top provinces producing potato in the Philippines and where potato is a cash crop. The existing production area is 5,446 ha but potential area for expansion is about 5,000 ha. (BAS, 2004). Farmers who grow potato purposely for seeds (25%) also produce ware potatoes but majority (79%) keep a portion of previous harvest as seeds for succeeding cropping. Generally, lack of seeds is associated with bacterial wilt infection. The disease has no immediate control and studies showed no variety is resistant either. This disease became endemic with continuous cropping and considered major constraint in seed production.

To survey potential areas, trainees from 13 recognized farmers' association facilitated rapid collection of soil samples for laboratory analysis using the selective medium (Kelman's medium) for isolation. Current mapping covered about 11.85 ha, where only 1.55 ha is free from bacterial wilt pathogen, 3.70 ha. with sporadic population and 5.6 ha highly infested . Identified areas free of bacterial wilt were prioritized for seed bulking of tissue culture-based planting materials such as rooted cuttings and generation zero tuberlets. Generation one tuberlets were bulked in open fields and those highly infested areas will be utilized for disease management studies to be conducted in participatory approach. All soil samples will also be subjected to golden cyst nematode population assessment. Continuous technical assistance and monitoring of dispersed clean planting materials are implemented to ensure more quality seeds for circulation.

Keywords: Bacterial wilt, Kelman's medium, golden cyst nematode

A-62 Survey and Identification of Quarantine Diseases and Other Important Diseases of Economic Crops in Car, Philippines

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The Cordillera Administrative Region (CAR) provides the ideal environment for the production of planting materials of semi-temperate vegetables, root crops, beverages, fruits and ornamentals. However, the presence of degenerative diseases caused by viruses do not only reduce yield in time but also affects the planting materials produced. Hence a survey was conducted in Abra, Apayao, Benguet, Ifugao, Kalinga and Mountain Province to identify and assess the incidence and severity of diseases of quarantine importance affecting high value crops.

For virus diseases, 100% incidence of Tomato Mosaic Virus (TMV) was recorded in one ha tomato farms at Bokod, Benguet; Banana Bunchy Top Virus (BBTV) with 40% incidence at Sablan, Benguet (0.20 ha); 20% in Balbalan, Kalinga (0.03 ha), 30% at Conner, Apayao (2.5 ha) and 20% in Aguinaldo, Ifugao (1.5 ha); Turnip Yellow Mosaic Virus in 80% of chinese cabbage plants (0.20 ha) at Buguias, Benguet; 15% incidence of Potato Aucuba Mosaic Virus (PAMV) in potato at Bauko, Mountain province (0.25 ha); and 12% incidence of yellowing, little leaf and mosaic symptoms in coffee seedlings in nurseries at Tublay, Benguet.

For bacterial diseases, 10% incidence of mushroom bacterial blotch (*Pseudomonas* sp.) was noted in La Trinidad and bacterial wilt (Ralstonia solanacearum Race 1) was isolated from seed potatoes collected in Atok, Benguet.

Fungal diseases documented were potato late blight, taro leaf blight, yam anthracnose, chrysanthemum white rust, anthurium leaf spot, strawberry leaf spot and berry rot, coffee leaf spot and panama wilt in banana.

Keywords: Quarantine diseases, semi-temperate vegetables

A-63 Composition and Abundance of Spiders Inhabiting Paddy Field on Fresh Swamp and Tidal Lowland in South Sumatra, Indonesia

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Paddy ecosystems in South Sumatra, Indonesia have specific characteristic consisting of wetland, such as fresh swamp and tidal lowland where spiders inhabited. The objective of this research was to analyze composition and abundance of spiders that inhabited paddy field of fresh swamp and tidal swamp in South Sumatra. Surveys were carried out in center of the fresh swamp and tidal lowland in South Sumatra, Indonesia. Spiders inhabiting paddy canopy were sampled using insect nets, and those dwelling soil were trapped using pitfall traps. The result showed that the spiders found on paddy canopy on paddy field of fresh swamp were 26 species and 10 species on soil. On the tidal lowland we found 25 species of spiders inhabiting paddy canopy and 18 species of spiders dwelling soil. Spider families found on paddy canopy on the fresh swamp were Araneidae, Tetragnathidae, Linyphiidae, Oxyopidae, Thomisidae, Theridiidae, and Salticidae. Soil dwelling spiders found on the fresh swamp were Lycosidae and Linyphiidae. Spider families found on paddy canopy on the tidal lowland were Araneidae, Tetragnathidae, Oxyopidae, Thomisidae, Theridiidae, and Salticidae. Soil dwelling spiders found on the tidal lowland of paddy field were Lycosidae, Araneidae, Linyphiidae, Thomisidae, Theridiidae, and Salticidae. Species inhabiting canopy were dominated by *Tetragnatha javana* and *Tetragnatha virescens*, but those dwelling soil were dominated by *Pardosa pseudoannulata* and *Pardosa sumatrana*. Thus, paddy ecosystem of the fresh swamp and the tidal lowland in South Sumatra had a lot of spider families and species.

Keywords: fresh swamp, paddy, spiders, tidal lowland

A-64 Combination of Natural Plant Product As attractant to Fruit Flies (Batrocera Spp.)

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Batrocera spp. (Diptera : Tephritidaea : Decinae) is one of important pests that causes damage to horticultural crops. A natural plant product, *Andropogon nardus* and *Citrus hystrix* are natural plant product as attractant to fruit flies so that can reduce fruit fly populations. The combined use A.nardus and C. hystrix is expected to increase the population of fruit flies that are interested. This study conducted on a laboratory and field scale. The laboratory tests conducted to test an effective combination to attract fruit flies and field testing to see the ability to attract various types of fruit flies on some commodities. The results showed that the combination *A. nardus* and *C. hytrix* are attracting against male and female fruit flies with the criteria of high to very high in both laboratory and field. There are 8 types of fruit flies are attracted, namely : *B. umbrosa, B. papayae, B. cucurbitae, B. albistrigata, B. persignata, D. leogni and B. musae* on various commodities.

Keywords: Andropogon nardus, attractant, Citrus hytrix, fruit flies, natural plant product

A-65 A Superior Cacao Clones Resistant of the Indonesia Province of South Sulawsi Against Cacao Pod Borer, Conopomorpha Cramerella Snellen and Helopeltis Sp on Cocao Intercropping System

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Cocoa Pod Borer (*Conophomorpha cramerella* Snellen) and *Helopelthis* sp. are the most important pests of cocoa crops in Indonesia. Level attacks of both pests are influenced by resistance of cocoa clones. The study aims to determine the level of resistance of 4 clones of superior cocoa Sulawesi (clone S1, clone M01, clone 45 and clone GTB) which were planted in intercropping with 20 cocoa clones to the intensity of Cocoa Pod Borer (CPB) and *Helopelthis* sp. Research has been conducted on organic cacao farm in the district Gantarang Keke, Bantaeng district, South Sulawesi, from November 2014 until March 2015. Sampling method for observing the resistance of each clone is done diagonally. Each pod sample, then, has been observed their levels of resistance to CPB and *Helopelthis* sp. based on the calculation of the intensity of pest attack. We observed that clone S1 has the highest intensity of CPB's attack (13.05%), and clone GTB as the lowest (2.89%). Observations on *Helopelthis* sp. attack shows that clone M01 has the highest intensity of attacks (32.22%), while clone 45 and clone GTB obtained the lowest percentage attack (27.78%).

Keywords: Cacao plant, Conopomorpha cramerella Snellen, Helopelthis sp., clones resistant, intercropping system

A-66 Morphological Identification and Molecular Characterization of Colletotrichum gloeosporioides Causing Anthracnose Disease on Mango (*Mangifera indica* L.) in Malaysia

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Mango, (*Mangifera indica* Linn.) belongs to the family Anacardiaceae, cultivated economically for commercial potential both domestic consumption and export value. Anthracnose disease caused by *Colletotrichum gloeosporioides* is the most destructive pre-harvest and post-harvest diseases on mangoes. In January 2015, infected mango fruits with anthracnose symptoms were observed in Taman Pertanian Universiti, UPM. The symptoms appear as irregular dark to brown spots on surface of the fruits and gradually enlarge in size leading to necrotic patches and decayed of the fruits. According to Du et al. (2005), C. *gloeosporioides* is a species aggregate with a wide range of morphological variation. However, there is limited research on the *C. gloeosporioides* species aggregate isolated from infected mangoes in Malaysia. A fungus was isolated from infected lesions and a single-spore culture was done on PDA agar. After 7 days of incubation at 28°C, the colony spreads rapidly, reaching 7 diameter, displayed aerial mycelium white, and gray-white to black colonies. Based on microscopic observations, the conidia are 1-celled, cylindrical, straight, hyaline, 10-20 µm long and 3.0-6.0 µm wide with a refractive spot in the middle. The pure fungal isolates were morphologically identified based on size and shape of conidia according to Sutton 1992. DNA genomic from fresh fungal mycelium was extracted using the UltraClean Microbial DNA Isolation kit. The PCR fragments about 650 bp of the ITS were sequenced and analyzed using nucleotide BLAST search in GenBank. This study is a significant step forward toward management recommendations in controlling anthracnose in mango production areas in Malaysia.

Keywords: mango, anthracnose, Colletotrichum gloeosporioides, PCR

A-67 Distribution and Control of Corynespora Leaf Fall Disease on Rubber in Indonesia

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An intensive literature review on distribution and control of Corynesporan leaf fall disease on rubber in Indonesia is needed as a part of continual efforts to manage the adverse effect of the disease. This paper tries to reveal out the review the work on distribution and control of Corynespora leaf fall disease in Indonesia. Leaf fall disease by Corynespora on rubber is widely distributed in Indonesia namely in North Sumatra, Riau, South Sumatra, Bengkulu, Lampung, Central Java, West and South Borneo with the desease severity ranging from light and severe. Severity of leaf fall disease, beside dictated by spatial differences, is dependent upon the rubber clones. From four rubber clones which were studied their severity due to Corynespora leaf fall disease, RRIM 600 clone was found to be the most susceptible. The severity of the disease in the rubber estates in North Sumatra, Riau and Jambi reached 69-76 percent. It was widely known that the leaf fall disease by Corynespora is a disease that widespreads very fast, as it is affected by weather factor. It, therefore, needs a monitoring system that take into account weather factor. Scientists have agreed on six tactics for managing the leaf fall disease by Corynespora, namely avoiding of introduction from other estates, suppressing innoculum production in the time of endemic by scrubbing the inactive innoculum, suppressing infection with toxic material, use of resistant cultivar vertically, use of cultivars that have horizontal resistency and giving a therapy for the infected plants. Good monitoring system is required for a better disease management of leaf fall disease due to Corynespora on rubber.

Keywords: distribution and control, Corynespora, leaf fall disease, rubber

A-68 Technique for Field Detection and Inoculation of Rigidoporus Microporus, White Root Fungus of Hevea

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White root fungus *(Rigidoporus microporus)* devastate thousands ha of rubber tree plantation in Indonesia and. The information on the presence of inoculums in soil in the field is important for farmers to make preemptive management action. In addition, appropriate and reliable inoculation technique is important for development control technique, i.e. screening hevea clone resistance, testing biological control agents and testing other control measures. The objectives of the research were: 1) to study cassava root as bait for detection white rot fungi in the soil, 2) to develop inoculation technique of

R. microporus on hevea young nursery plants. Cassava root cut and starchy banana fruits were tested as baits, with artificial inoculated soils, at various concentration of inoculum levels i.e. 10^2, 10^3, 10^4 cfu/g soil. Frequency of baits colonized by *R. microporus* and other fungi was examined. Two inoculation techniques were tested, first was using sawdust-rice bran based-inoculum, and inoculum based on shoot sticks of rubber trees with the 18 months-old hevea young nursery plants. Cassava root was good as baiting materials to *R. microporus* , it was able to detect the fungus in concentration of 10^3 cfu /g soil. Inoculation technique using rubber sticks based inoculum yielded successfully root disease including, root necrosis, wilting and root colonization.

Keywords: Rigidoporus, Cassava,Baiting, Colonization, Inoculum

A-69 Bioeffectivity of Bacillus Thuringiensis–based Product on Media of Several Agricultural Waste Towards Lepidopteran Insect Pests

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Some important insect pests, such as armyworm Spodoptera litura, and diamondback moth Plutella xylostella belong to Lepidopteran insects. They must be controlled. As alternative of using chemical treatment, Bacillus thuringiensis based-product is able to control these insect pests. B. thuringiensis, a gram-positive bacteria, produce crystal protein poisoned to suitable insect. The purposes of research were to investigate which media suitable to grow B. thuringiensis and their toxicity effect to insect pests. Treatments used to grow B. thuringiensis were agricultural waste, i.e. (P1)soybean soaking water, (P2) coconut water, (P3) rice soaking water, (P4) mixture of soybean soaking water and coconut water (1:1, v/v), (P5) mixture of soybean soaking water and rice soaking water (1:1, v/v), (P6) mixture of coconut water, rice soaking water and soybean soaking water (1:1:1, v/v/v). B. thuringiensis isolate used was originally isolated from South Sumatera, Indonesia lowland area named as MSP-02. Numbers of spores produced were observed after being shaking of 72 hours at 200 rpm. Bioassay test was conducted toward S. litura, P.xylostella, as well and their mortality during 7 days after treatment was recorded. The result showed that every treatment (P1 – P6) was suitable for growing B. thuringiensis and the highest number of spores was observed at P6 (mixture of coconut water, rice soaking water and soybean soaking water (1:1:1, v/v/v). Mortality of P. xylostella was higher than thus on S.litura. Agricultural waste could be used as cheap, safe media for producing bio-insecticide.

Keywords: Bacillus thuringiensis, Bio-insecticide, Plutella xylostella, Spodoptera litura, Agricultural waste

A-70 The Impact of Organic Fertilizer Utilization on Phytopthora Pod Rot and Cocoa Pod Borer Incidences in Cacao Plantation

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Phytopthora pod rot (PPR) and cocoa pod borer (CPB) are serious pests giving lost of around 60% and 70% respectively on cacao productivity in Indonesia. In this trial we tried to evaluate the impact of cultural practices by using organic fertilizer made from difference source of organic material on incidences caused by PPR and CPB. The organic fertilizer treatment consist of liquid organic fertilizer, HK compost, BH compost, DN compost, liquid organic fertilizer plus HK compost, liquid organic fertilizer plus BC compost, liquid organic fertilizer plus DN compost and all of this was compared with NPK synthetic fertilizer. The liquid organic fertilizer was applied through spraying on plant surface, while solid fertilizer was applied through buried in soil. The incidence by PPR was respectively 12.0%, 11.0%, 1.0%, 9.0%, 12.0%, 6.0%, 12.0%. and 12.0% at seven weeks after treatment and the incidence by CPB was respectively 22.9%, 18.1%, 13.3%, 16.9%, 20.1%, 19.4%, 21.9%, 23.1% and on time of pod harvest, while on control the incidence was respectively 20.0% and 24.0%. This data showed that application of organic fertilizer can reduce incidence by PPR and CPB. BC compost offered more impact on the reduction of the incidence, but this incidence re-increased when the compost was combined with liquid organic fertilizer spraying.

Keywords: Cacao pest, compost, liquid organic, spraying, buried.

A-71 **Resistance and Susceptibility of Selected Banana Cultivars to Fusarium Oxysporum F.sp. Cubense Strains in the Philippines**

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The response of the selected banana cultivars towards the strains of *Fusarium oxysporum* f.sp. *cubense* (*Foc)* tropical race 4 VCG 1213/16 and race 1 VCG 126 was determined. It was measured in terms of the disease incidence and severity of vascular discoloration and leaf symptoms. The reaction of the different cultivars varied depending on the virulence of the Foc strains, indicating differential response of host cultivars. Field inoculation test using Gran Naine (AAA) and Lakatan (AAA), Latundan (AAB), Cardaba (BB) and Cavendish somaclonal variant, GCTCV-119 (AAA) with *Foc* strains tropical race 4 VCG 1213/16 and race 1 VCG 126 was done. Corn meal sand medium inoculated with Foc was used as inoculum. Results showed that Lakatan, Gran Naine and Latundan have the highest disease incidence and severity when inoculated with *Foc* TR4 VCG 1213/16 indicating susceptible response. While Cardaba has significantly low incidence and severity caused by *Foc* TR4 VCG 1213/16 that resulted to resistant response. On the contrary, Latundan and Cardaba was severely infected with race 1 strain VCG 126 while other cultivars were resistant. The exhibited cultivar specificity of *Foc* VCG 126 to Latundan and Cardaba resulted to susceptible reaction. GCTCV-119 showed high resistance to both *Foc* strains. The results provided insights on better understanding on the concept of *Foc* races where previously believed that any banana cultivar susceptible to Race 1 is also susceptible to TR4. This information is relevant in cultivar deployment in areas of epidemic with known *Foc* strain.

Keywords: Fusarium wilt, resistance, susceptibility, Foc, banana

A-72 **Optimal Storage Condition for Prolonged Use of Immunochromatographic Strip**

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An immunochromatographic strip (ICS) is a simple and rapid test kit, very useful for on- site screening of plant virus disease. However prolonged storing condition will be beneficial to its routine use and commercialization purpose. In this study, the ICS specific to *Cucumber green mottle mosaic virus* (CGMMV) was produced, characterized and tested for optimal long-term storing condition. Three factors studied affecting its shelf life including containers, temperatures and natural light or dark conditions had been investigated for one year. Two containers were utilized either a 15-ml conical tube or a 3x4 cm zipper storage bag. Storing temperature at room temperature or 4°C were compared. The dark condition was carried out in aluminum foil-wrapped containers. A 3.5 gm of silica gel was added to each treatment as desiccant. Each month, three replicates of ICS from each treatment were drawn and tested with healthy and diseased plant sap compared to purified CGMMV at 50 µg/ml. After one month of the storage, all treatments still showed similar result compared to freshly prepared ICS. However after the second month, the ICS stored in the zipper bag under natural light at room temperature showed lowest reactivity and continually declined. The result at the end of the experiment demonstrated that the ICS kept in either container under dark at 4°C gave the best reaction at test lines over one year storage.

Keywords: Cucumber green mottle mosaic virus, CGMMV, immunochromatographic strip, ICS, storage condition

A-73 **Diversity of Microorganisms in Farms Grown With Semi Temperate Crops in High and Mid-mountain Zones in Benguet Northern Philippines**

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Infected plants were assessed in the field and soil samples were collected during the rainy and dry season in high and mid mountain zones of Benguet to: determine the prevalent diseases affecting selected semi -temperate vegetables; assess the abundance of soil fungi and bacteria in the soil samples; and, isolate possible beneficial microorganisms as biological control against plant pathogens. Microorganisms associated with diseased plants and microorganisms found in the soil were identified based on their morphological and cultural characteristics.

Results of the 2013 to 2014 survey showed that turnip yellow mosaic virus of Chinese cabbage, club root, and black rot of cabbage were the diseases with high incidence of 77.69 %, 57.51 and 46%.
On soil fungi, *Penecillium* was isolated in all samples. *Cladosporium, Fusarium, Curvularia,* and *Aspergillus* were next to *Penecillium* in terms of abundance.Fungi with lower frequency were *Alternaria, Pestalotia, Bipolaris, Corynespora, Verticillium, Paecelomyces, and Botrytis. Paecelomyces variotii, Penecillium* and *Cladosporium* are known biological control agents against bacteria, nematode, fungus, mealybugs, and aphids.
For bacteria, *Streptomyces* and *Bacillus* are dominant in all soil samples. *Pectobacterium* and *Xanthomonas* were lower in abundance while *Pseudomonas* and *Ralstonia* are the lowest bacteria isolated in both mountain zones. *Bacillus, Streptomyces* and *Pseudomonas* are biological control agents against nematode and several fungi.
The diversity index of 3.27 and 2.59 for fungi, and 2.35 and 2.74 for bacteria in the high and mid mountain zones when use as indicator to describe the soil condition of the sampled areas generally indicate a good soil health.

Keywords: Survey, Beneficial, Microorganisms, Biological, Control

A-74 Impact of Chromolaena Odorata Invasion on Plant Biodiversity, Botanical Composition and Soil Mineral Contents in Pasture Area.

CANCELLED

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Chromolaena odorata (L.) R.M. King and H. Robinson, an exotic plant from tropical America has invaded large of tropical and subtropical areas in the world. This study investigated the effects of *C. odorata* invasion on species richness, diversity, botanical composition and soil mineral contents in overgrazed pasture in South Sulawesi Indonesia. As determined by various ecological indices, there were higher species richness and diversity of plants in invaded localities than in non-invaded localities. In invaded localities, the dominant species were forage legumes and other broad leaves weeds and in non-invaded localities, the dominant species was forage grass. Soil under invaded localities contained higher N, K, Mg, K and Na than open localities.

Keywords: Chromolaena odorata, biodiversity, botanical composition, soil mineral content

A-75 Symptom Expression and Transmission of Columnea Latent Viroid Related to Eggplant Growth Stages.

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The three eggplant cultivars (long purple, long green and Thai eggplant, *Solanum melongena* Linn. cultivar Farmer Long, RPG and Jamica, respectively) were used to investigate the symptom expression and transmission of *Columnea latent viroid* (CLVd) due to they have been reported to be the cultivated variety host of CLVd as symptomless which can be a good source of inoculum for other susceptible host such as tomato. This investigation was decided to inoculate the CLVd on the three growth stages of eggplant as seedling, vegetative and flowering stages, to study the relation of eggplant cultivar and plant growth stage to CLVd infection. The result showed that the symptom expression of CLVd infection was severe symptom development on the seedling stage of inoculation such as the vein chlorosis on mature leaf and following by vein necrosis then leaf drop, plant stunt, reduction of leaf and flower size on all cultivars at 10 weeks post-inoculation. In contrast, only moderate symptoms were observed on the vegetative and flowering stages of inoculation. However the flowering stage of inoculation was symptom expression at 10 months post-inoculation in this study. By reverse transcription-polymerase chain reaction technique, all of flower parts from the infected plants and further preliminary test on fifty whole seeds of CLVd infected "Jamica" eggplant, the results were positive for CLVd. This investigation will be continued for more information which is useful for solanaceous seed production.

Keywords: Solanaceae, Pospiviroidae, viroid detection, vegetable crops

A-76 Response of Parasa Lepida Cramer (lepidoptera: Limacodidae) to The Inoculation of Entomopathogenic Virus Extracted From Naturally Infected Setora Nitens Walker (lepidoptera: Limacodidae)

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Slug caterpillar *Parasa lepida* Cramer is found in Pakistan, India, Bangladesh, Nepal, Srilanka, Thailand, Laos, Vietnam, Malaysia, Philippines, China, Japan and Africa. The insect feeds on various hosts including acasia, apple, banana, cashew, cassava, cherry, citrus, cocoa, lichi, mango, mulberry, oil palm, peas, pineapple, rose, rubber, and tea. In Japan, the insect infests broad-leaved species of street and fruit trees. In Indonesia, *P. lepida* has been increasingly important as oil palm defoliator. The damages caused by the insect on the palm are similar to those caused by other slug caterpillar such as *Setora nitens* and *Setothosea asigna.* However, there was a tendency that *P. lepida* would appear abundantly when other slug caterpillars disappeared. The problem caused by *P. lepida* is even greater since the caterpillars have very irritant tufts of venomous spine poisonous to the touch, and their cocoons are covered with irritating hairs. Therefore, there is a need to control the caterpillars to ease the problem faced by oil palm planter, especially by applying biological control. This experiment was conducted to examine the response of *S. lepida* caterpillars to entomopathogenic virus extracting from naturally infected *S. nitens*. Three different methods of virus inoculation were applied, sprayed directly to the caterpillars, sprayed to the feed (oil palm leaves), and sprayed to the caterpillars feeding on oil palm leaves. The results showed that the caterpillars responded similarly to all inoculation methods. The average mortalities were 94%, 97% and 98% respectively, and the LT_{50}s were 29.47 , 34.23, and 28,37 minutes respectively.

Keywords: Parasa lepida, Setora nitens, entomopathogenic virus, oil palm

A-77 Exploring The Potential of Endophytic Bacterial Consortium As Biocontrol for Meloidogyne Javanica in Tomatoes

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Meloidogyne spp. (root knot nematode) is the most important tomato-infecting nematode. Infection caused by root knot nematode may cause low production of tomatoes, even it may cause 100% yield loss by assosiation beetween root knot nematode with soil-borne pathogen(s). There were so many reports about the effectivity of single-isolate endophytic bacteria, but there were no report about the effectivity of consortium-isolate endophytic bacteria in controlling root knot nematode. This research aimed to obtain consortium-isolate endophytic bacteria from 16 kinds of plant which could effectively controlled the root knot nematode. Isolation of bacteria was conducted by using 5 kinds of media (NA 20%, NA 50%, TSA 20%, TSA 50%, and King's B) and surface-sterilized root sample were used as the source of bacteria. All of the isolates had to give negative result in hypersensitive and haemolytic tests for making sure that these isolates were safe to be used in next examinations. Their ability to produce protease, chitinase, and cyanide acid, to fix nitrogen, and to chelate phosphate were also tested. Subsequently, we select the consortium-isolate endophytic bacteria with their ability to control *Meloidogyne* spp. in tomato effectively. The selection process were conducted by emerging the seeds in the suspension of consortium-isolate endophytic bacteria to be planted in steriled soil. The four-week plant were transplanted to plastic pot and they were generally susceptible to be inoculated with 300 juvenils of *Meloidogyne* spp. Agronomical and pathological traits were observed 40 days after inoculation. From this research, 80 consortium-isolate endophytic bacteria were successfully isolated and 17 of them were safe to be used as biological control. Physiological test has shown 16 protease-producing isolates, 12 chitinase and cyanide acid-producing isolates, 4 nitrogen-fixing and phospate-chelating isolates. Three isolates found effectively suppressed the population and infection of *Meloidogyne* spp. came from: 1) tomato, isolated by using NA 20%, 2) tomato, isolated by using NA 50%, and 3) "pecah beling ungu", isolated by using TSA 20%. Isolate from tomato, isolated by using NA 50% was strongly suggested as highest effective biological agents in controlling root knot nematode.

Keywords: Biological Control, Lytic Enzymes, Root Knot Nematode, Endophyte, Consortia

A-78 Bio-resource Management in Rainfed Farming in Central Myanmar

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Myanmar needs to adopt a climate resilient and sustainable development path. Over 80% of crop cultivation is rainfed and important crops are rice, maize, pulses, and oilseed crops. Survey visits were conducted in dry zone in 2012 to study rainfed farming with sustainable bio-resource management practices. As the main source of energy for cooking, 69.2% of households used firewood, including pigeon pea stems and rice-husk stoves. Over ten thousands rice mills produced ~ 22 million tons of rice husks annually and rice mills with rice-husk gasifiers were 1,096 in 2010. In 2014, 32.4% of households used electricity, although disparities between urban and rural were striking. Myanmar had ~14 millions cattle, producing sufficient dung for biogas rural electrification. Community sized biogas plants were 105 in 2010. Farmers feed livestock with crops residues, and manure are traditional natural fertilizers. Rice straws are applied for mulching in garlic growing. Corn residues are valuable cattle feed as fresh or dry, and corn cobs as fuel**.** Tatkone Agricultural Research Farm introduced composting techniques from corn residues. As traditional compost making in dry zone, sesame residues were placed in a large hole and cattle were fastened to trample on them to incorporate with cow dung for about ten months. Under the climate change scenario, climate resilient practices will play a key role in agriculture sector. Moreover, together with economic development in Myanmar, proper bio-resource management practices should be prioritized to sustain its ecosystem and natural resources.

Keywords: dry zone, compost making, climate resilient practices, crop residues, Myanmar

A-79 Spatio-temporal Pattern of Water and Soil Nutrients and Grain Yield in The Rice Terraces Landscape of Banaue, Ifugao, Philippines

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The rich indigenous knowledge of silvicultural and agricultural practices of the Ifugao Rice Terraces has been documented. Based on previous participatory approaches, water and nutrients from the forest (*muyong*) flow down to irrigate the rice terraces (*payoh*). Although local knowledge exists, no scientific study has been conducted to investigate the interaction of the two land uses. This study aims to determine the spatio-temporal pattern of water and soil nutrients and grain yield in the rice terraces landscape.
Results showed that irrigation water had moderately acidic pH (6.2 – 8.0). Moreover, no significant difference was observed on pH levels among *payohs* located at different distances from the *muyong* and on water collected at different months. Conversely, total nitrogen and potassium decreased significantly from July to October when rainfall tended to increase. For nitrate levels, results showed higher concentration in upstream (1.5 ppm) compared with the downstream sites (0.6 ppm). Soil analysis showed medium level of organic matter (4.55%) and phosphorus (12.19%), and moderately low level of nitrogen (0.15% - 0.33%) and potassium (0.28 meq/100g soil). Phosphorus and potassium levels showed significant trend across distance. Specifically, upstream sites showed higher phosphorus and potassium levels than downstream sites. Significant decrease from July to October was also observed on soil pH. The higher concentrations of nutrients in *payoh* sites located near the *muyongs* could be translated to similar trends on rice growth and yield. Although not statistically significant, trend analysis suggests higher vegetative and grain yield performance of rice from upstream sites (1.44 t/ha) compared to downstream sites (1.19 t/ha). Hence, results revealed that water nutrients, soil nutrients and productivity in the rice terraces are affected by spatial distance from the *muyong*. These findings have substantial implications for the continuous conservation of the rice terraces landscape.

Keywords: rice terraces, water nutrient, soil nutruent, grain yield, Banaue

A-80 Classification of Sugar Acid Ratio in 'Gedong Gincu' Mango Using Near Infrared Spectroscopy

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'Gedong Gincu' is one of the leading mango cultivars in Indonesia due to its sweet taste, medium size and beauty orange color. This mango cultivar is classified into its taste, sour, sweet-sour and sweet commonly judged by aroma and experiences. It is becoming increasingly difficult due to consummers demands on a prime quality guarantee.The objective of this works was to classify the quality of 'Gedong Gincu' mango based on the sugar acid ratio nondestructively using near infrared spectroscopy (NIRS). Near infrared wavelength of 1000-2500 nm was used in this work. Partial least Square (PLS) was selected to develop calibration and validation model of the correlation between NIR reflectance and reference data. The best model of calibration and validation in predicting sugar acid ratio was found for the model using pre-process combination of spectra data of n01 and

dg1 with 4 PLS factors. The accuracy of model was indicated by the value of r, SEC, CVc and RPDc i.e. 0.89, 29.81%, 24%, 2.23 for calibration model and 0.78, 34.92%, 30%, 1.61 for validation model. From this finding, it is concluded that the developed model could classified the quality of 'Gedong Gincu' mango based on the sugar acid ratio with accuracy of 80%.

Keywords: Gedong GIncu mango, near infrared spectroscopy, sugar acid ratio, non destructive

A-81 Effect of Low Temperature Storage on Tomato Fruit Quality

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Vegetables are quite important to improve health condition of Afghan people, and tomato (*Solanum lycopersicum* L.) is one of the most important crops grown in Afghanistan because it is now a major vegetable crop that has achieved tremendous popularity over the last century (Wener, 2000).
In Afghanistan, the main challenge is to keep tomato freshness after harvest and temperature management is regarded as the most effective tool for maintaining the quality and shelf life after harvest. In addition, low temperature storage could be a trend for moment in Afghanistan, such as zero energy cool chambers (ZECC) and cellar storage.
In the presentation, it will be mentioned on the physiological changes of tomato fruit (sugars, organic acids, vitamins, ethylene production etc.), which are stored in different cool temperatures.

A-82 Effect of 1-mcp Treatment on Quolity of Several Vegetables

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Afghanistan is a war-torn country, which lacks adequate infrastructure such as cold storage, cold chain system etc. for post-harvest handling of fruits and vegetables. It might take decades to improve infrastructures and technology in order to reduce the post-harvest losses. One possible solution could be the use of chemicals such as 1-MCP in order to reduce the loss after harvest as it is cheap, acts in trace level, easy to apply and can be imported from neighboring countries.
In this paper, the efficacy of 1-MCP treatment on different stage of harvest of vegetables and fruits along with the quality attributes at ambient temperature will be discussed, as well as the possible down regulation of ethylene production effected by 1-MCP treatment.

A-83 Effect of Selected Edible Coatings to Extend Shelf-life of Longan Fruits Var. 'Huong Chi'

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Edible films and coatings have received considerable attention in recent years because of their advantages including use as edible packaging materials over synthetic films. By functioning as barriers, such edible films and coatings can feasibly reduce the gases and water movement through this film and thus reduce respiration rate and water loss, and also reduce fungi infection. This work which was carried out at Faculty of Food Science and Technology, Vietnam National University of Agriculture, to determine the optimal edible coatings to extend the shelf life longan fruits var. 'Huong Chi'. Longan fruits were coated with the emulsion coatings of 2% chitosan, 0,5 and 1% carrageenan and placed in 1% perforated polyenthylene pack. Color (L, a, b, and browning index), weight loss, fruit rot, nutritional quality and sensory evaluation were done every week of storage at 4ºC. Results show that longan fruits coated by 2% chitosan and 1% carrageenan slow down discoloration and browning index. 1% carrageenan coating also reduced weight loss, fruit rot and remained high nutritional quality compare to control fruits. Therefore edible films and coatings could extend shelf-life of longan fruits and keep the quality of the apples during 4 week storage.

Keywords: chitosan, carrageenan, alginate, edible coatings

B-01 Empowering Communities through Capacity Building in Conflict Affected Areas in Mindanao (CD-CAAM) Program: Promoting Tilapia Culture1

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The Japan International Cooperation Agency (JICA) led a participatory -coordinated approach with several development agencies in capacitating communities. JICA was joined by IC net Limited, Bangsamoro Development Agency (BDA), MSU-Maguindanao and LGUs. The projects sites were 4 barangays in 2 Municipalities of Maguindanao in ARMM.

Technical surveys were conducted to determine current situation, opportunities & issues in the area. The "Promotion of Tilapia Culture and Marketing" was recommended to be undertaken. The pond and cage cultures were piloted. The parameters considered were pond sizes, culture period, seed stockings (number, size & rate), total & estimated harvest (productivity), survival rate, feed consumed & feed conversion rate (FCR).

The productivity differs in sites. The survival rate also differs. There were significant differences in FCR and survival rate between pond and cage cultures. Thus, a higher productivity was observed in cages than in ponds. The growth trend in pond culture went up at better angles, compared with other cases. However, compared with the growth rate and the FCR, the survival rate was very low. The low survival rate seriously reduced the fish production in ponds during this period.

The growth curve in cages went up better than the pond culture. It indicated proper feeding management by the beneficiaries. It is deduced that environmental factors, such as water temperature and plankton density in the water reservoir raised fish growth rate. The survival rate of harvested fish was also high (73 %). The overall FCR score (1.60) also showed the ideal feeding management.

Keywords: Capacity building, empowered communities, conflict-affected areas, productivity, tilapia culture

B-02 Empowering Communities through Capacity Building in Conflict Affected Areas in Mindanao (CD-CAAM) Program: Promoting Tilapia Marketing1

CANCELLED

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Communities in conflict affected areas were empowered through a Capacity building program. The Japan International Cooperation Agency led a participatory -coordinated approach with several development agencies that include the Japanese consulting firm IC net Limited, Bangsamoro Development Agency (BDA), MSU-Maguindanao and LGUs. The projects sites were 4 barangays from 2 Municipalities of Autonomous Region in Muslim Mindanao.

A team conducted Technical surveys to determine the current situation, opportunities & issues in the area. The team recommended the "Promotion of Tilapia Culture and Marketing" based on geographical and social conditions of fisheries activities. Most of the beneficiaries from the 4 sites sold their products directly at the local markets. The BDA made efforts to find local customers who were interested in their cultured fish. Most of customers admitted better taste and freshness of their cultured tilapia.

Only one Barangay sold about 1/3 of their produced to local middlemen, who retails local fish market. However, the middlemen buy fresh fish at lower prices that lowered their profits. In most sites where products were sold directly to the local markets, higher income was obtained. Since most of harvest was sold as fresh, only small-sized fish were processed as dried tilapia "tilanggit". Only small amount were sold as "tilanggit" in the local market.

In order to maintain sufficient profit and operational cost for future production, a market channel and prices analysis shall be considered. The cultured fish should be directly sold to the local markets and avoid middlemen for higher profitability.

Keywords: Capacity building, empowered communities, conflict-affected areas, productivity, tilapia culture

B-03 DNA Barcoding of "sinarapan", Mystichtys Luzonensis (smith, 1902) in Four Different Lakes of Bicol Region

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The Sinarapan samples collected from four (4) different lakes of Bicol Region, Philippines – Lakes Buhi, Danao, Manapao, and

Bato, were identified using DNA barcoding to determine their true identity and compare their phylogenetic relationships. The CO1 region with approx. 650 bp was amplified because of its capability to differentiate taxa. Our findings showed that CO1 can be used as a DNA marker in molecular identification of the fish samples. Samples from two (2) out of four (4) lakes had successful sequencing. BLAST results, Maximum Parsimony, and Neighbor-Joining Trees revealed that those collected from Lakes Buhi and Bato are not species of Sinarapan but rather species of *Leiopotherapon plumbeus* and *Rhinogobius giurinus*, respectively. Furthermore, DNA barcoding is very useful in proving the true identity of unknown samples.

Keywords: Goby fish, Sinarapan, DNA barcoding, CO1 gene, Bicol Region

B-04 Outcomes of Pilot Projects under Capacity Building in Conflict Affected Areas in Mindanao (CD-CAAM) Program

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The Japan International Cooperation Agency (JICA) led a particatory coordinated approach with several agences through a caaty building proram. JICA was represented by its development experts and consulting firm Inet limited . Other players were Bngsamoro Development Agency(BDA), Mindanao State University ad LGUs. The project sites were 4 barangays in 2 Municipalities Mguindanao in ARMM.

The profitability using cage culture is better than pond culture Largest portion of operation costs was feeds. The pprocessin g of dried fsh added income. The achievement on extension services differs. The beneficiaries can independently their chores. Tehnical guidance is needed . All subject areas can be done well . The technical achievements of beneficiaries also differ. The support given to them have influenced higher achievement on extension.

The effects of extension were very effective as showny impoved mangement skills on thecultureof tilapia,prcessg and marketing and knowledge sharng seminars . The level of technical and management capacities of BDA were signfiantly enhanced. However , coordinaton and communication a the organizational level need improvement. Mos beneficiaries considered the impact of the project very significant in community stenghtening, technical improvement, and income generation. The outcomes of the pilot project are discussed in this paper

Keywords: Capacity building, empowered community, conflict–affected areas, project outputs, productivity

B-05 Analysis of Immune Related Genes in Milkfish (Chanos chanos) by Transcriptome Sequencing

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Milkfish (*Chanos chanos* Forskall) is one of the most important fish in the aquaculture industry of Indonesia, Taiwan and the Philippines. Most of the previously reported studies in milkfish were addressed in understanding ecology, nutrition, feed development, and culture of the species while little is known about its genetics and immunology. Here we used RNA sequencing to identify immune related genes in both healthy milkfish, and milkfish exposed to an oral vaccine containing inactivated *Aeromonas hydrophila*. A total of 88,393,109 reads corresponding to 5.6 Gb was obtained. Since there is no available reference genome, de novo assembly of the quality checked reads was done using Trinity. The assembly yielded 37,546 contigs. From the assembly, identity of 21,288 contigs was reported after annotation using BLAST2Go. Gene ontology (GO) annotation was performed and immune relevant genes were identified using GO terms related to immunity like Response to bacteria, Immune Response, Response to stimulus, Immune system process and Defense response. Differentially expressed immune-related genes were identified. Three downregulated genes were identified namely thymosin beta-11, major histocompatibility complex class II and the complement c1q-Tumor Necrosis Factor-related protein. On the other hand, the upregulated immune related genes include coagulation proteins (coagulation factors and prothrombin), complement cascade proteins (mannan-bindling lectin serine protease, some complement proteins), antimicrobial proteins (alpha-2-macroglobulin and hepcidin), and pathogen recognition proteins (NLRC3-like, PVR-related protein). These immune related genes may serve as biomarkers for the evaluation of fish health and immunity, which can lead to the improvement of aquaculture technology and fish management practices.

Keywords: Next generation sequencing, RNA-seq, immunity, milkfish

B-06 Electrochemical Response and Removal of Endocrine Disrupting Chemical by a Carbon Electrolytic Reactor

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This paper summaries an examination of operating conditions for electro-chemical oxidation of trace endocrine disrupting chemicals in synthetic wastewater containing estradiol (E2) and 2,4 dichlorophenol (DCP). The results show that although E2 and DCP oxidized in the range of 0.5-0.8V, the optimal condition for electropolimerization is achieved in alkaline condition. In addition, the continuous treatments show that more than 80% of removal efficiency was achieved with an energy consumption around 1-10 Wh/m^3. It is recommended that further studies using existing material at the local site should be conducted to make this process possible in practice.

Keywords: Next generation sequencing, RNA-seq, immunity, milkfish

C-01 A Community Establishment for Achieving Implementation of Integrated Water Resources Management and Sustainable Agriculture at Saba River Basin Level, Northern Bali, Indonesia

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Saba watershed as one of 391 watersheds in Bali-Penida River Basin has water flows up to four times on wet season compared to dry season conditions. The watershed has many development issues including soil erosion hazard, land cover and agricultural land use changes, water degradation, competitive use of water resources, and inefficiency of irrigation canals. Saline water and sedimentation of the river and irrigation canals are not only due to the soil erosion but also by the daily behavior of local people who drops garbage into river. These conditions made the water scarcity for public water demand and irrigation especially in dry season. A physically effort in order to solve the issues is to build Titab Dam (2011–2015) with its multi-purposes are to supply irrigation and domestic water, electricity reserves, for tourism and fishery development, and for conservation. Moreover, it is very important to encourage social engineering inform of the Saba Watershed Forum establishment for promoting multi-stakeholders roles in achieving implementation of IWRM as well as sustainable agriculture based on *Tri Hita Karana* philosophy. Multi-stage of focus group discussion (FGD) method under participatory approach through stakeholders meetings and preparation meetings was used to gather primary data. All data were analyzed by using descriptive qualitative method. The roles and functions of the forum are as communication body and to make coordination and negotiation across sectors and stakeholders levels, to make and implement action plans, and as promotion and education agency.

Keywords: *Saba watershed forum, integrated water management, sustainable agriculture*.

C-02 Supply Chain Improvement of Organically Grown Vegetables in Central Luzon, Philippines

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The research covered the major vegetable producing areas in Central Luzon, namely: Nueva Ecija, Pampanga, and Zambales. Survey, key informants interview and focus group discussion were used as well as supply chain management framework in the analysis.

The major organic vegetables raised were eggplant, tomato, ampalaya and stringbeans. The supply chain is simple and the keyplayers include: input provider; farmer; assembler-wholesaler; retailer; and consumer. Except in Nueva Ecija where supermarket is an institutional buyer, the chain generally follows a traditional supply chain where wet markets remain as the major destination of vegetables and serving as primary retailer for the consumer.

Cost of production was the major cost item in the chain which amounted to Php11.60 per kg for eggplant, Php16.13, tomato and Php13.98, stringbeans in Nueva Ecija. In Pampanga, the cost was Php6.33 per kg for tomato, Php5.09, eggplant and Php14.59, ampalaya. The cost in Zambales amounted to Php7.32 per kg for eggplant, Php19.96, ampalaya and Php20.86, stringbeans.

Among the keyplayers, the assembler-wholesaler who generally drives the chain, realized the highest margin of Php10.00 per

kg across sites.

The logistical issues denote some degree of inefficiencies in the chain to include insufficient supply of quality organic inputs; low yield during transition; inadequate knowledge on concept and technologies on organic production; high cost of certification; limited market outlet; unequal market arrangement; and limited consumer awareness. Areas for improvement points to assistance in organic certification, organic inputs development/commercialization, equitable marketing arrangement, increasing level of consumer awareness and greater access to market information.

Keywords: ORGANIC VEGETABLES, SUPPLY CHAIN, LOGISTICAL ISSUES, AREAS FOR IMPROVEMENT, ORGANIC CERTIFICATION

C-03 Development of Pest Management Products and Systems for Organic Vegetable Production in The Cordillera Administrative Region: A Journey From The Laboratory to The Farm

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The project was conducted to develop pest management products and systems for specific insect pests and diseases of priority organic vegetables in the Cordillera Administrative Region; to test the efficacy and socio-economic acceptability of the potential pest management products and systems; and to evaluate the profitability of the developed technologies.

Laboratory bio-assays were conducted testing several botanicals using different extractants. Extracts of pepper (*Capsicum annuum*), garlic (*Allium sativum*) and ginger (*Zingeber officinale*) were more potent using vinegar as extractant. The liquid formulations of combined botanicals were more effective against cabbage cutworm, pod borer and bean aphids with contact and stomach type of action. It was also effective against Fusarium wilt (*Fusarium oxysporum* f. sp. *pisi)*. In addition, combining botanical extracts plus *Bacillus subtilis* suppressed disease development in garden pea.

In the greenhouse trials, these liquid extract combinations were effective against blackrot (*Xanthomonas campestris* pv *campestris)* while baking soda and sunflower suppressed late blight (*Phytophthora infestans*) infection in potato. In the control of powdery mildew of garden pea *(Erysiphe* sp.), EYCOG (egg yolk plus canola oil plus garlic) was most effective.

Potential products developed are: NPV and BSU GaP for cabbage, EYCOG and Organo BIG for garden pea and Organo Sun for potato. Comparison of the profitability of organic and conventional farming practice was done in Cattubo, Atok, Benguet. In using the above biopesticides in combination with the best variety and organic fertilizers developed ,ROCE for organic cabbage, garden pea and potato were higher than those grown conventionally.

Keywords: botanicals, extractant, biopesticides

C-04 A Study of Consumers' attitude Towards Organic Vegetables in Metro Manila, Philippines

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In the Philippines, there is an increasing interest and demand on organic vegetables due to the efforts of different stakeholders – the farmers, Non-Government Organizations (NGOs), and the government (OCCP, 2003; Singian, 2012). Organic vegetables are now available in mainstream distribution channels like supermarkets. So, the availability of organic vegetables is not limited to weekend markets and specialty stores. Because of this situation, consumers' awareness level on organic vegetables is increasing.

Organic vegetables are positioned as healthy, delicious, good for the environment, and safe alternatives from ordinary vegetables that are free from pesticides and other chemical inputs (Carating et al., 2010). It is very important to know the perceptions, beliefs, and attitudes of consumers towards organic vegetables. This information will be useful for producers and sellers in developing marketing strategies for organic products. By knowing the factors or attributes that consumers give much importance, producers and sellers can focus on improving certain characteristics to appeal to more consumers. Also, this information can be used in formulation of policies and education programs to ensure consumers make informed choices (Ara, 2003).

This study aims to identify the factors that differentiate organic vegetable consumers to non-organic vegetable consumers and to measure the willingness to pay for organic lettuce. It is hypothesized that organic vegetable consumers have higher income, higher level of awareness and understanding of organic products, and are more willing to pay for organic vegetables. It is also expected that organic vegetable consumers understand the attributes and differences of organic and ordinary vegetables.

Keywords: organic vegetables, willingness to pay, consumer behavior, organic lettuce

C-05 **Consumer's Perception and attitude About Organic Food: A Case Study of Consumers from the Rural and**

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Growing consumers' concerns on food safety, health and environment in the recent decade has resulted increased demand for organic food across the world, including emerging economies such as Indonesia. This paper aims to analyze Indonesian consumer's perception and attitude to organic food. In this case, rural and urban area can be geographic factor affecting different perception among consumer to organic food. A quantitative survey with a sample of 200 consumers living in rural and urban area was conducted to explore consumers' perception and attitudes toward organic food. Structural Equation Model used to analyze relationship among variable. The results show that there are significant differences between rural and urban consumers in term of perception and attitude to organic food. Characteristics of consumer such as education, access to information, location and income have significant influence on consumer perception and attitude.

Keywords: organic food, consumers' perception, rural, urban, Indonesia

C-06 **Agricultural Extension Workers' attitude Toward Organic Agriculture in Magsaysay, Occidental Mindoro**

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The study aims to determine the profile of the agricultural extension workers in Magsaysay, Occidental Mindoro, their attitude towards organic agriculture, and the relationship between the profile of the agricultural extension workers and their attitude towards organic agriculture.
The descriptive-correlational research design was used. The randomly selected agricultural extension workers in Magsaysay, Occidental Mindoro served as the respondents of the study. The modified attitude survey by Chouichom & Yamao (2010) was adopted. Further, Key Informant Interview (KII) with the farmer-technician and Municipal Agricultural Officer were done to validate the data.
Results show the agricultural extension workers in Magsaysay, Occidental Mindoro were in their middle aged, with long extension experience, college graduate with specialization on agriculture and fisheries, and introduce new technologies and practices with the farmers through "frequent" group meetings, method demonstration, farmer field school, establishment of demo farm, conduct of farm/home visits, and use of information and communication technologies.
The agricultural extension workers have "positive" attitude towards organic agriculture. The organic farming knowledge, environmental, marketing, and cost & benefit aspect were rated "agree" while the marketing aspect was rated as "undecided."
The number of years spent as extension worker and extent of extension modalities used are not significantly related to the attitude towards organic agriculture. However, age and number of years spent in formal education have a significant relationship.

Keywords: agricultural extension, extension modalities, organic farming

C-07 **Enabling Factors Associated With the Implementation of the National Greening Program towards Sustainable Agriculture in the Philippines As Perceived by The Students of A Southern Tagalog Agricultural State University**

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This study sought to examine the enabling factors associated with the implementation of the National Greening Program (NGP) as perceived by the students of a Southern Tagalog agricultural state university. The National Greening Program is a multi-agency project initiated by Executive Order No. 26 that aims to reduce poverty, promote food security, environmental sustainability and biodiversity conservation, and enhance climate change mitigation and adaptation. A total of 300 randomly-selected students was chosen as respondents of the study. Data were analyzed using frequency counts, percentages, neutral median scores, and Kendall tau-b rank correlation. Results showed that the respondents understood the NGP in terms of its policies, strategies, mechanics, and participants (Md=2.0). They also perceived the program positively with its goals and objectives (Md=4.0). They saw the NGP as more than a school requirement. Finally, the respondents accepted the NGP because they had positive median scores for students' understanding, environmental awareness, perceived feasibility, and perception of

the program as more than a school requirement. Acceptability was strongly correlated (tau-b=0.664) with the students' perception of the NGP as more than a school requirement. Meanwhile, there was a very weak correlation (tau-b=0.134) between acceptability and their level of environmental awareness. There was a weak correlation (tau-b=0.249) between the students' understanding of the program and their acceptability of it; yet there is a moderate relationship (tau-b=0.411) between the students' perceived feasibility of the NGP and their acceptability of it. Respondents further perceived the NGP not as an obligation to fulfill, but a sincere concern for the environment. Students' perception, especially of a state-run university, of this government initiative to promote environmental sustainability provides valuable insight of potential policymakers and future government stakeholders.

Keywords: National Greening Program, enabling factors, students' perception, environmental sustainability

C-08 Enhancing Agricultural Biotechnology Education: The Philippine Experience

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Current trends in modern agricultural biotechnology resulted in the need to promote awareness of biotechnology and its products in the Philippines. Biotechnology education prepares people to make informed decisions about biotechnology processes and products. The National Institute of Molecular Biology and Biotechnology of the University of the Philippines Diliman (NIMBB) has embarked on projects to promote biotechnology education nationwide. The first project in 2002-2003 was a series of seminars nationwide entitled "Frequently Asked Questions About Biotechnology" or Biotech FAQS. In 2007-2008, NIMBB UP Diliman (in cooperation with the country's Commission on Higher Education, CHED) and funded by the Biotechnology Program of the Department of Agriculture, embarked on another project entitled "Instituting a General Education Biotechnology Course in Philippine State Universities and Colleges". The project resulted in the institution of the GE Biotechnology Course in some colleges or addition of biotechnology topics in their biology courses. Teacher's Guide for teaching the GE Biotechnology course was produced. In the same project, the first National Biotechnology Education Conference for Teachers (NBECT) was organized and is now an annual activity supported by the Department of Agriculture. A National Biotechnology Quiz Contest for High School (NBQC) organized by NIMBB in 2008 has been conducted for four years (2008, 2012-2014). The GE Biotechnology courses and addition of topics on Biotechnology offered in colleges and universities, the annual conduct of NBECT and the NBQC and the continued support of the Department of Agriculture, have paved the way for promotion of biotechnology education in the Philippines.

Keywords: BIOTECHNOLOOGY, AWARENESS, GENERAL EDUCATION COURSE, EDUCATION

C-09 Local Community's Perspectives on Marine Park Area in Tinggi and Sibu Islands, Johor, Malaysia

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Marine Park Area (MPA) was developed in Malaysia since 1994 with an objective to protect and conserve various habitat and aquatic marine life. The establishment of MPA was also intended to improve marine resources such as fisheries and coral reefs from facing further deterioration due to overfishing. However, the establishment of MPA have a broad array of positive and negative social, economic, cultural, and political impacts on local communities. Thus, the objective of this study was developed to determine local community's perspectives on MPA in Tinggi and Sibu Islands. A face-to-face interview with 69 respondents being local people using a structured questionnaire was conducted in both islands located in Mersing, Johor. Census data from Mersing district office and village chieftain was used as a sampling method. The data collected were analyzed using descriptive analysis, mean ranking analysis, chi-square test, and factor analysis. The findings revealed that the result of mean ranking analysis based on 5-point Likert scale statements on perception of fisheries community on economic and tourism development towards the gazettement were ranged between 2.97 to 3.43. Further, five factors that impact fisheries community livelihood namely tourism development, natural resources, livelihood security, job opportunities, and economic benefit were extracted from factor analysis. The result of this study showed that the community in Tinggi and Sibu Islands perceived hardships due to declining incomes and livelihood status from the MPA. The gazettement of MPA indicated some positive and negative economic and tourism development impacts to the fisheries community inhabiting the islands. The study suggested the need for the Marine Department to revise and provide sufficient areas for sustainable fishing.

Keywords: impact, fishermen, Marine Park Area, Sibu Island, Tinggi Island

C-10 Moving Toward Going Green: Sustainable Productivity Growth in the Philippine Swine Sector

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Very few published papers have taken the undesirable input effects in productivity change analysis particularly in the livestock sector of emerging economies such as the Philippines where swine production is a major economic activity and a potential pathway for poverty reduction. As environmental concerns in swine production increase and as green growth initiatives are being promoted in the context of sustainable development, there is urgent need to consider these non-marketed environmental effects. This paper hopes to contribute to the limited literature of using the Malmquist Total Factor Productivity Index that is adjusted for environmental performance and as applied to swine production.

Keywords: Environmental impacts, Swine sector, Green growth, Environmentally sensitive Malmquist productivity index, Philippines

C-11 Valuing Natural Ingredients for Sustainable Agriculture

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The demand for natural ingredients has been on the upswing in recent years due to increasing awareness and recognition of their positive effects on consumers' health and nutrition. Natural ingredients supply different vitamins, minerals, essential fatty acids, and nutritive elements and thus used in many commodities as additives and risk-reducing agents. Unlike other agricultural commodities, natural ingredients are not produced synthetically, not genetically engineered and do not contain synthetic ingredients and chemical preservatives.

The Philippines is noted for its rich flora, from which a wide range of natural ingredients can be found. Citronella and lemon grass are two of them. They can be grown even by small farmers as alternative crops not only to increase their income but also to protect the environment. However, their potential and sustainable production depends on their competitiveness with imported natural oil ingredients. Using domestic resource cost (DRC) analysis, this paper assesses the price competitiveness of citronella and lemon grass.

Keywords: natural ingredients, citronella, lemon grass, sustainable agriculture, domestic resource cost

C-12 Evaluation of the "Gulayan Sa Paaralan" (GPP) in Selected Secondary Schools in Taguig, Philippines

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This study explored the experience of implementing "Gulayan sa Paaralan" (GPP) as a subprogram of the National Greening Program (NGP) of the Department of Education(DepEd) in selected secondary schools in Taguig Philippines. Using qualitative semi-structured interviews and survey conducted among students and teachers, the impact of GPP in promoting sustainable agriculture in the communities was evaluated. The findings showed that institutionalization of GPP is a good way in familiariazing students with methods of sustainable food production in an urban setting. GPP promotes experiential learning and environmental awareness among students. Self-sufficient fund sourcing, using resources that are available in their areas and having a collaborative effort are some strategies done by the schools to achieve successful implementation. However, the impact of GPP in promoting the production of own vegetables to consume in the community did not appear. To attain sustainability, it is important to develop collective responses and collective forms among different stakeholders in terms of production and consumption.

Keywords: National Greening Program, Sustainable agriculture, Urban vegetable gardening

C-13 Management Responses to Farm Risks: Evidence of Fattening Cattle Business in Central Java Indonesia

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Risks and uncertainties already known to play an important role in agriculture. Even so, the perception of cattle breeders about their business risks is still very important to learn. The purpose of this study was to determine the beef cattle business risk management and the factors that influence the decision of farmers to minimize the loss of the use of micro-credit fund in farming activities. The study was conducted in 5 regions as the center of production and development of beef cattle in Central Java, i.e. Blora, Rembang, Grobogan, Wonogiri, and Boyolali. A sample of 50 farmers who have access to microcredit determined by multistage random. The data was then analyzed using descriptive statistics, Chi-square and logistic regression techniques. The results showed that the ratio between equity and credit were 32.9 and 70.1 where 80% of farmers obtained credit on food security and energy scheme (KPPE scheme) with average interest of 6.48% in a period of 24.63 months. There were significant differences of income among the strata, where the rate of income of the strata 1 was IDR 936,960; stratum 2 was IDR 5,037,797and stratum 3 was IDR 11,088,795. Based on the perception of farmers, the source of which is considered the most important risk is the length of the dry season, high operational costs of inputs, the import of cattle and the high capital costs for equipment and enclosures. To minimize the risk of production, farmers diversified both on-farm and off-farm

Keywords: micro-credit, risk management, cattle, fattening

C-14 Constrains, Issues and Challenges in Malaysia Small Ruminant Farming

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Small ruminant (goat and sheep) is the fourth (4th) major livestock after swine, chicken and cattle in Malaysia. The contribution of the small ruminant industry to the agriculture output growth is becoming more important and it requires high significance. Increasing human population, urbanization and incomes, coupled with changing consumer preferences are creating higher demand for industry and their products. Several problems facing this industry including feed price, breed and stock, price of meat and live goat, ranchers' skill and management and capital for rearing small ruminant. An attempt has been made to explore the issues and challenges small ruminant ranchers and industry in Peninsular Malaysia and prevailing management practices at household level. A total of 600 ranchers in ten (10) states were selected as respondents in this study. The results indicated that, the major issues and challenges for the ranchers in small ruminant industry were feed (71.3% respondents), disease (52.2% respondents) and capital (48.3 respondents). There is a need to develop small ruminant farming and find out the better solution for the major issues. In addition, the involvement of the youths and women in the industry can be also one of the improving factors. Hence, government and private sector should pay great attention for the development of small ruminant industry that can bring an interest to the ranchers and boost up farmers livelihood in Malaysia.

Keywords: management, policy, production, rancher, small ruminant

C-15 Rice Farming and Agriculture Insurance in Bali, Indonesia

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Agricultural sector including rice production still plays an important role in the Bali economy despite of its worldwide known for its tourist destination. However rice production in Bali is susceptible to loss caused by flood, drought and pest and disease, as well as from the climate change. Adaptation to climate change is required to minimize the risk along with the plans and strategies for food security and sustainable development. The government of Indonesia (GoI) has legal basis on the Farmer Protection and Empowerment Act (Law No. 19/2013) to the implementation of agriculture insurance program to minimize the risk in production failure. The GoI plans to implement the insurance scheme in the beginning of 2015. Considering the importance of crop insurance to agriculture, this study attempts to explore the potency of such insurance to identify opportunities and challenges in agriculture insurance implementation in Bali. A survey was conducted on 100 farmers from two farmers' organizations (*subak*) to identify the awareness and perception of farmers towards the insurance and adaptation to climate change. The study empirically presents awareness and perception of farmers towards the insurance and adaptation to vulnerability of climate change. The study concludes with various suggestions for increasing the awareness of farmers for ensuring better penetration of agriculture insurance in Bali.

Keywords: rice farming, agriculture insurance, farmer's awareness and perception

C-16 Adoption, Impact and Sustainable Management of Medicinal Plant Cultivation for Alternative Income Generation in Tribal Communities in Gujarat

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Background Vasavas are a tribe from Gujarat state in India who have rich tradition of indigenous medicine and have traditionally practiced sustainable traditional subsistence farming. However, they are now economically and educationally deprived due to limited cash income sources. A possible sustainable way for their economic development is by creating alternative income sources in agriculture by using their understanding of medicinal plants. From an ethnobotanical study undertaken with this tribe, an informal self-help group, was established that promoted the cultivation of medicinal plants (MP) for generating additional cash income for them.
Research Objective: 1. Elucidating factors influencing adoption of this technology 2. Characterize growing environment of MP. In the first phase, we tried to find the intra-member differences that affect the intensity of adoption of MP cultivation technology as a source of generating additional income.
Methodology: Semi-structured questionnaire survey was conducted for all the members of the group and plants' ecophysiological data was collected in their agricultural field and/or home garden during February-March 2015, at Dediapada.
Results and discussion: One of the hypothesis is that access to stable income in the family would affect the level of adoption of this technology. Previous knowledge of medicinal plant doesn't seem to affect their decision to cultivate more plants. However the annual profit from selling of cultivated of MP was higher for farmers with stable income. Characterizing such factors can lead us to find to better solutions for intensifying level of adoption of cultivation of medicinal plants for generating higher income.

Keywords: ADOPTION, MEDICINAL PLANT, INDIA

C-17 Bioprocessing of Non-food Biomass for Sweet Sorghum for Cellulose Ethanol

Moved to H01

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Lignocellulosic biomass which includes the residual non-food biomass from agricultural sector is a potential global alternative feedstock as this does not create issues on food vs. fuel. However, the complex cross linking of the three basic chemical components of the biomass: cellulose, hemicellulose, and lignin makes the material recalcitrant to hydrolysis for further biorefining. Study on the bioprocessing of sweet sorghum bagasse to cellulose ethanol using a combination of physical, biological and mechanical treatment was conducted. The biomass material was prepared and sieved to 40 and 80 *mm mesh before they were treated separately with Pleurotus ostreatus and Trichoderma sp. following the solid state fermentation protocol. The effect of sonication to further release glucose from the physico-bio-treated biomass was evaluated with subsequent anaerobic fermentation to ethanol at the laboratory and up-scale condition. The study aimed to evaluate the activity of the independent and co-culture of the two fungi to delignify and saccharify the sweet sorghum waste biomass at different particle size and hope to establish an efficient bioprocessing protocol for agricultural waste biomass as feedstock for cellulose ethanol production. The biodegradation effect of the fungi in general, was generally higher in the smaller particle sized samples of 80mm than at 40mm mesh. The independent culture of P. ostreatus showed higher delignification than Trichoderma sp.and their co-culture. Glucose released and glucose saccharification on the other hand, were found higher in those samples treated with the co-culture of both fungal strains than their monocultures. Sonication treatment increased glucose release thus higher ethanol yield. Even without physico-biological treatment, sonication can release substantial amount of glucose in alkaline medium making it a potential treatment for the bioprocessing of biomass for cellulose ethanol production.*

Keywords: bioprocessing, cellulose ethanol, saccharification, sonication, fermentation

C-18 Islamic Financing Risk Analysis in Agricultural Sector

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One of the main problems of agricultural sector in Indonesia is the lack of financial support. There are many financing programs which available to overcome this problem, but this problem still persist. Thus, the alternative financing scheme such

as Islamic financing that concern on risk sharing concept rather than profit, is a feasible solution. Moreover, the increase of Islamic financing on agricultural sector requires many studies. One of them is about financing risk analysis as well as risk management instruments and systems. This research is applied at BPRS (Islamic Rural Bank) Amanah Ummah, Leuwiliang, Bogor, Indonesia, which provides financing for agricultural businesses. Thus, this research is focused on analyzing Islamic financing risk and measuring potential loss. In addition, this Islamic financing risk is analyzed with Enterprise Risk Management (ERM) framework method and the potential loss is measured with creditrisk method. Overall, this research contributes to literatures on Islamic financing in agricultural sector and provides ground-study related to financing risk analysis on Islamic microfinance institutions.

Keywords: agriculture, enterprise risk management, Islamic financing

C-19 Sensorial Acceptability and Nutritional Quality of Leguvoron (Polvoron With Leguminous Plants)

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Food processors are faced with an increased demand by health professionals and consumers for healthier and fortified food products. Some food formulations have been developed to produce healthy foods. Polvoron which is considered a delicacy; a desert or snack is really liked by small children especially those who are in the elementary, high school, college students or even professionals and household members.

The original polvoron is made up of flour which is more on carbohydrates. Through this study which is entitled, "Sensorial Acceptability and Nutritional Quality of Leguvoron", the original Polvoron was improved by adding or fortifying legume which has a very high nutritional content and a good source of protein and micronutrients like folate, thiamine, manganese, magnesium and iron.

The improved Polvoron when consumed can help solve the malnutrition problem in the world. The project Leguvoron can also augment family household income. The objective of the study is to improve the sensory and nutritional value of the product. In additional to control sample using only wheat flour, five (5) different formulations were prepared using varying wheat and five legume ratios. Sensory analysis using fifty untrained panel and proximate analyses were performed. The results revealed that significant differences in appearance, aroma, taste and texture were not observed among the products. However the sensory assessment of the products on the 5-point hedonic scale depicted that all products score were more than three on the scale which is an indication that all sensory attributes were positive. However, the overall evaluation among the different samples in terms of the panel indicated that all products were acceptable with Treatment three (3) being the most preferred or liked very much. Positive purchase intent was noticed among the panel hence offering new sales potential.

Keywords: Leguvuron, legumes, food processing, polvoron, sensory evaluation

C-20 Gac Fruit as a Potential Superfruit for Economic and Social Well Being

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Momordica cochinchinensis Spreng or Gac Fruit belongs to the melon family, Cucurbitaceae. The species name is derived from the Cochinchina region in northern Vietnam where it was first discovered. It is also found in many other countries in Asia and Australia. The creeper is dioecious and can be propagated from seeds and cuttings. The appropriate ratio between male and female plants should be around 1:10, but in field observation it shows there are more male than female plant. As such, manual pollination is recommended to obtain higher survival rates. While fruiting, it is initially green in colour then turns yellow and matures to a bright red colour. Each fruit contains many seeds covered in moist red aril (seed membrane) which contains very high levels of lycopene and carotene. Gac has been deemed as a superfruit as it has many health and nutritional benefits. The plant grows well in tropical conditions. Cultivation of Gac would potentially improve livelihoods of rural poor farmers and also meet increasing demand for Gac as health supplement. Production, processing and market demand need to be developed to suit small and large scale production.

Keywords: Gac fruit cultivation; Super-fruits, Carotenoids; Lycopene

C-21 The Out of School Youth and Their Participation in The Rice Farming Activities in San Jose, Occidental Mindoro, Philippines

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The incidence of out-of-school youth is felt nationwide and even worse in other regions. In fact, it has become a phenomenon in San Jose, Mindoro that the youth are dropping out of school to be involved in the labor force in rice farming.
The study aims to determine the profile of the out of school youth engaged in rice farming activities; determine their level of participation in the different rice farming activities; and identify the problems encountered in participating in the different rice farming activities.
The study used the descriptive research design. The gathered data was validated through the use of participatory approach using field observation and personal interview.
Results show that the out-of-school youth are young, male, single, lives separately with their parents; belong to a large household, and literate. Financial problem, difficulty in learning, and the lack of interest in schooling are some of the reasons for dropping out school.
The "highly adopted" type of labor were *arawan*, *tamp*a, and *kabesilya*. Majority of the respondent's earning was in cash basis with an average monthly income that is below the poverty threshold of the province.
The out-of-school youth has "high participation" in rice farming activities that needs hired labor. They were constrained with land ownership issues, low salary, lack of benefits and management style of the owner.
The study recommends to conduct in-depth study on the labor system employed by the out-of-school youth farmers.

Keywords: out of school youth, labor, rice farming

C-22 Strengthening the Vegetable Sector in The Cordillera Administrative Region (car), Philippines Through An Entrepreneurial Oriented Approach

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The opportunity for agriculture to go beyond production of food alone necessitates embrace of entrepreneurial endeavor to contribute to sustainable development. Yet, entrepreneurial orientation (EO) is a distant concept to agriculture not only in theory but also in practice, thus the interest where this study lies. The focus of this study is on assessing the influence of EO on the performance of vegetable farms in the Cordillera Administrative Region, Philippines thereby strengthening this sector. Taking a sample of 157 farmers who are owners, part-owners and lessors of the land they till, a survey questionnaire was administered from April until August 2015. A follow-up focused group discussion also ensued. Results confirmed that farmers' management of farms was limited to production. Amongst the dimensions of EO, only autonomy in farm management showed better result, the rest as innovativeness, proactiveness, risk-taking and competitive aggressiveness yielded moderate exhibition. Likewise with performance indicators: product quality, efficiency, flexibility and responsiveness, only product quality fared well. Essentially, only competitive aggressiveness and autonomy made an impact on farm performance indicators. Innovativeness however manifested influence on farm responsiveness. Conclusively, vegetable farms should leverage from production only to becoming profitable productive enterprises. An EO becomes more imperative with the advent of the ASEAN Free Trade Agreement, globalization and modern technologies making market competition stiffer.

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Keywords: entrepreneurial orientation, performance, vegetable farms

C-23 The Bottom-up Activities of Farmer`s Groups in Indonesia -a Case Study at Pemalang District, Central Java-

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Since the green revolution in 1960's, farmer`s groups have had a important role to expand government programs that aimed to increase food production. The programs were implemented with the top-down approach from the Central Government to farmer's level. However, after the democratization since the end of 1990's, farmers can organize their activities themselves. In this situation, what kind of role do they have for the smallholder farmers? Do they succeed to develop the agriculture with

bottom-up approach?

This research investigated the role of farmer`s groups that is organized by farmers in a village, which is located in Pemalang, Central Java north coastal plain area, Indonesia. This research analyzed social and economic situation of villagers and compared the roles of farmer`s groups of rice paddies, sugarcane, and jasmine in the research site.

The study concluded that farmer`s group have the important role of supporting farmers in relation to the production, distribution, and financing. The jasmine farmer`s group builds market channel successfully by establishing the relationship with factory and merchants. The group has a good influence to villagers so that all jasmine farmers belong to the group. Sugarcane farmers' group was also successful by keeping good networks with other organization. These groups work with bottom-up approach because they are managed by not central authority but farmers` initiatives. On the other hand, rice paddy farmer`s group does not work at all in the village after the government program was finished.

Keywords: Farmer`s group, Bottom-up approach, Jasmine, Sugarcane, Rice paddy

C-24 Sugarcane Cultivation after the Ruin of New Order Regime

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Since 1960s sugarcane cultivation had been stated as less profitable commodity. Then, since TRI (smallholder sugarcane intensification program) was launched in 1975 and until the policy was repealed in 1998, loss by loss beared by farmers had continually reported. Generally speaking, introducing TRI to farmers put them as a people without any choice, attached to governments will. Luckily, Indonesia's government had a great achievement in 1984 by its self-supporting on sugar provision for national consumption. The ironic was, it just a single achievement. Due to population and consumption growth combined with stagnation in sugar production, the gap between sugar production and consumption was getting substantial and import was an unavoidable option. And when smallholder cover about 54,3% from the total area of Indonesia's sugarcane, several studies judge them as a source of problem and labelling their low productivity was caused by technical and ecological problems - cultivation on dry field, lack of capital, the continuing of ratoon and sluggish on adopt new variety and last but not least, low fertilizer input. Other studies addressed that problem to the inefficiency of sugar factory. Both of the explanation were plausible but failed to explain the basic problems from smallholder side, why they did not maximize their production. Based on ethnographic research combine with data from households survey in Comal, Indonesia, this paper attempts to explain that problems of low productivity on smallholder could not be merely put on technological and ecological problems, but also related to dynamics of household resources.

Keywords: sugarcane, smallholder, post new order regime, low productivity, household resources

C-25 The Indigenous Food and Its Role in Household Food Security among the Tau-buids in Occidental Mindoro, Philippines

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The study aims to determine the socio-economic characteristics of the Tau – buids; identify the indigenous food that is part of their diet; and determine the role of indigenous food in household food security.

The study employed descriptive method of research. Fifty (50) respondents were selected using simple random sampling. The data gathering was conducted on June 2011to March 2013.

Result shows that the Tau-Buid were subsistence farmers in their productive years, literate with a medium household size, and their income falls below the below the poverty threshold of the province.

The Tau-buids consumed indigenous food when in season and during "lean months." Nutrition and health were never considered by the Tau-buids in the production and consumption of indigenous foods. Its availability means survival.

The study recommends to conduct a qualitative study on the role of indigenous food in the changing economic condition of the Tau-buids.

Keywords: food security, Tau-buid, indigenous food

C-26 Upland Women and Climate-responsive Farming in The Highlands of Occidental Mindoro, Philippines

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Women in the uplands are not only keepers of the household but are also tillers of the land. They are recognized as stewards of natural resources as they possess innate wisdom that helps them understand and cope with realities in their environment. Thus, this study posited that the upland women farmers in Sitio Naibuan, Batasan, San Jose, Occidental Mindoro, Philippines employ climate-responsive farming practices; that the women are highly knowledgeable about effects of climate variability on farm productivity; and that women's profile is related to the climate-responsiveness of their farming practices and level of knowledge of effects of climate variability on farm productivity. This study further theorized that the women's level of knowledge of effects of climate variability on farm productivity is related to the climate-responsiveness of their farming practices.

Seventy Hanunuo Mangyan (one of the Philippines' indigenous peoples) and non-Mangyan women farmers participated in this exploratory study. Triangulation method comprising of individual interview, focus group discussion, and use of secondary data was employed. Chi-square was used to determine relationship between variables.

The women are young and lowly-educated but they are highly knowledgeable about the association between climate variability and farm productivity. Their farming practices are found neither climate-responsive nor climate-irresponsive. Influence of modern agriculture in farming is visible particularly in seed selection and pest control. The women's profile is not related to the climate-responsiveness of their farming practices and level of knowledge of effects of climate variability on farm productivity. The women's level of knowledge of effects of climate variability on farm productivity is related to the climate-responsiveness/irresponsiveness of some farming practices.

Keywords: Sitio Naibuan, Batasan, climate-responsive, upland women farmers

C-27 A Study of the Farming System in Hilly Areas in Son La, Northwest Vietnam

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The northwestern part of Vietnam is a mountains area adjacent to the border with China and Laos. Many ethnic minorities live there. Many of these ethnic minorities are people who have moved there from Chin. Moreover, in recent years, there has been a migration of Kinh people who are a peculiar tribe. They emigrated after the Indo-China war and U.S. war. Thus, although many tribes are intermingled in this area, the quota/ segregation of an area has been performed by the tribes. Traditional agriculture is inherited in the village of each tribe.

Son La is located about 300km to the west-northwest of Hanoi and the altitude is about 700m surrounded by 1000m class mountains. The annual average temperature is 21.9°C, with 7.3°C as the monthly average lowest temperature, and as the 36.4°C of average maximum temperature. It has 1,480mm annual precipitation and a rainy season and dry season.

This study investigated agriculture today in the village of Thai people and H'mong people which are ethnic minority groups in Son La District. The agricultural problems of a farming system and the present situation were also investigated from October, 2014 to March, 2015.

The problem of farming in Tham village is the price of products, which are vegetables and livestock. Especially the price of vegetables is seasonally changed. Moreover, since vegetable cultivation uses much insecticide, it was necessary to grow products which will have added value from safety and high quality by less chemicals use.

The main cash crops in Tay Hung village are fruit trees, potatoes, and coffee. Since the scale is not large, it is necessary to perform intensive cultivation, producing with added value, and improvement of marketing. And it is useful to make a branding strategy by introducing the technology of added value production systems in both village.

Keywords: added value product, cropping system, ethnic minority, hilly area, rural development

C-28 Are Rice Tenants Paying More Than The True Economic Land Rent?

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Despite the advantages of owner-operated farms based on equity and efficiency grounds, land rental market plays a big role as a means of providing access of land to poor farmers. However, the existing policy on land rent is still anchored on the provision of a law that was codified in 1963. It is hypothesized in this paper that the basis for setting the land rent in 1963 may no longer be reflective of the true contribution of land in the production process given the advances in rice production technologies. The data used in this analysis was drawn form a survey conducted in the province of Laguna, Philippines for the

2014-2015 cropping cycle.

Employing marginal productivity analysis of Cobb-Douglas production function, it was established that majority of the leasehold tenants in the study sites paid more than the true economic rent of the land. The affordability concept which was the primary basis of codifying, by virtue of R.A. 3844, the rent pegged at 25 percent of the net income based on previous harvests is deemed obsolete. Back in the 1960s, the policy was relevant and appropriate because at the time, rice farming was very simple and main factors of production were land and labor. In today's rice farming technology, the contribution of land as a factor of production has diminished because of the increasing capital intensity of rice production. The use of modern farm machineries like farm tractors, rice transplanters, reapers, threshers and even combine harvesters has increased the capital intensity of modern rice production resulting in the diminution of the contribution of land in the production process. The use of modern farm inputs like fertilizers and chemical inputs further pronounced the diminution of the contribution of land to the rice production process. Hence, in order to reflect the realities of modern rice farming technology and to adhere to the basic principle of land rent affordability, the land rental provisions as mandated in R.A. 3844 should be amended.

Keywords: Tenancy, Land Rent, Economic Rent, Marginal Analysis, Policy Ananlysis

C-29 Enhancing The Livelihood Opportunities of Women Farmers of Mulanay, Quezon, Philippines

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The women farmers of a coconut-producing village in Quezon Province, Philippines usually raise one to two native pigs on a very low-input system for additional income. They produce fatteners to cater the roasted pig market of urban centers. However, lack of capital for the purchase of stocks and feeds limit the growth of this enterprise. In addition farm gate price of market animals at 30 kg, reared for five to six months in this system was low at an average of US$1.30/kg live weight or US$40.00. This is way below the price of commercial breeds at US$2.10/kg live weight, raised for two to three months using commercial feeds. However, these native pigs when roasted and sold in urban centers command premium prices at US$150 - US$167 for a 30 kg animal because of their unique flavor and the perception that they are healthier. Despite low farm gate prices, the women farmers continue to raise native pigs.

An assessment of this production system showed opportunities for improving productivity and income. A project was then conducted to 1) improve animal performance by improving management practices and nutrient availability through the use of locally available feeds; 2) develop alternative native pork products for value addition, and 3) apply a modified sharing scheme for sustainable livelihood. Results showed improvements in animal productivity, at least 50 percent increase in household income and 100 percent repayment of the loaned animals.

Keywords: Women, livelihood, native pigs

C-30 The Effect of Transaction Cost on Profits and Capital formation of Soybean Farming in Lamongan, East Java

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Transaction cost is one of the characteristics of imperfect market. Transaction cost of soybean farming affects the level of profit soybean farming. Profit is one of the factor of capital formations on soybean farming. The purposes of this research are to analyze the transaction cost structure and the effect of transaction costs on the profitability and capital formations of soybean farming. Research method uses transaction cost analysis and simultaneous equation. The results showed that the transaction cost component on soybean farming consists of (1) information cost; (2) negotiation cost; (3) coordination cost; (4) enforcement cost; (5) monitoring cost and (6) risk cost. The amount of the transaction cost that are formed on soybean farming was Rp144 120.86. Negotiation cost was the highest cost of transaction cost component that was 60.30%, followed by information cost (14.07%), coordination cost (12.22%), enforcement cost (8.03%), monitoring cost (4.23%) and risk cost (1.15%). Transaction cost have a significant effect on the profitability of soybean farming. Capital for land is the primary capital in the installment of soybean farming which is 37.48%. Other capitals include: vehicle (22.80%), plants (17.91%), husbandry (12.09%), building (6.83) and supporting tools (2.88%). Transaction cost does not have a significant effect to the establishment of initial capital since the portion is very small, it is only 3.91% out of overall profit.

Keywords: transaction cost, profit farming, capital formation

C-31 The Effect of the Partnership System on the Supply Chain and Companies Performance of Japfa Broiler Business in the City of Padang

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This research was conducted on April 15th - June 30th 2015, a case study in Japfa Company and partner farmer. The aimed of this study is (1) to analyze the effect of partnership, bargaining power, enterprenuership on the supply chain performance of the broiler business with partnership system, and (2) to analyze the influence of supply chain performance to company performance. The scope of this study is limited to the partnership system Japfa Company with broiler breeders in the city of Padang and surrounding areas. Respondents consisted of 120 broiler breeder, using primary and secondary data that collected by using the questionnaire with Likert scale 1 to 5. Data processed by Structural Equation Modeling (SEM) amos 16.0 The research concludes that the partnership system influence the supplychain performance as 43,30%, bargaining power as 27,40% and enterprenuership as 20,10% effect on the performance of the supply chain significantly. Mean while Supply chain performance is also influence the company's performance as 62,10% significantly.

Keywords: partnerships, bargaining power, enterprenuership, supply chain performance

C-32 Readiness Towards Halal Logistics Among Food-based Logistics Service Providers (lsps) in Malaysia

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Halal is a code to describe things or actions that permitted by Shariah (Islamic Law) and it should be performed to show an obligation towards Islamic faith basically towards food ingredients. However, *halal* aspect is not only restricted for ingredients of food products but includes anything related to the *halal* food. In a way to serve *halalan toyibban* products to end consumers, all parts in supply chain of *halal* products also should be conducted according to *halal* guidelines. Logistics services are one of the parts in supply chain and most of *halal* food producers using logistics services from logistics service providers (LSPs). As *halal* food demands increasing, logistics players should be ready towards emerging of *halal* market in order to ensure *halal* integrity along *halal* food supply chain. Thus, the objective of this study was established to investigate the readiness factors among Malaysian food-based LSPs for *halal* practices. Face-to-face interviews with 156 food-based LSPs were carried out using structured questionnaires to measure readiness towards *halal* logistics. Relevant analyses were carried out to describe LSPs company's profiles and to identify factors that influence LSPs readiness towards *halal* practices. The results of this study indicated that company vision to change, *Halal* Assurance System, employees acceptance, external and internal environments of the organization, and management support were the five factors that influenced readiness towards *halal* logistics by the LSPs. Meanwhile, presence of Muslim workers, knowledge on *halal* logistics, and experience in complying with any assurance system were determined as the factors that mostly influenced readiness towards *halal* logistics. Since the result of this study clearly showed that important of knowledge on *halal* logistics, experienced with standard or assurance system and presence of Muslim workers have significant effect on LSPs readiness for *halal* practices, thus authorized agency should impose compulsory *halal* terms for food-based LSPs.

Keywords: Halal, logistic service provider, food-based, Malaysia

C-33 Trade Impacts of Sanitary and Phytosanitary Measures on Philippine Fresh Banana Exports in Asia, 1990-2014

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Sanitary and phytosanitary (SPS) measures have been used as non-tariff barriers to trade. The country's accession to multilateral and bilateral trade agreements, which aims to facilitate freer trade, has not fully benefitted the Philippines due to the stricter SPS measures of selected importing countries. The Philippine National Standard for fresh banana export was harmonized with ASEAN standards and the Codex Alimentarius requirements in heavy metals, pesticide residue and hygiene. Stringency analysis, however, showed that South Korea and China implemented specific standards for countries wherein hazardous pests and diseases in fresh banana have been identified. Japan lowered its maximum residue limit for fresh banana export and reduced the number of active substances that can be used in pesticides. Using time series data from 1990 to 2014, results of the multiple regression analysis revealed that the SPS measures had a negative impact on the volume and value of Philippine fresh banana exports to major Asian markets. Other factors affecting these variables were tariff, foreign exchange rate, domestic wholesale price, and export price. It is recommended that the Philippines actively asserts its position regarding

the SPS measures on fresh banana exports before the dispute settlement bodies under GATT-WTO and AFTA framework.

Keywords: free trade agreement, ASEAN, China, South Korea, Japan

C-34 Channel Choice of Vegetable Producers in the Cordilleras, Philippines: A Transaction Cost Approach

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In this paper, Transaction Cost Theory is applied to understand sustainable development in agriculture. As economic cost is a major driver of sustainable choices, how transaction costs affect channel choice decisions of vegetable producers in the Cordilleras, Philippines was investigated. Based on a cross-section survey of 152 farmers, the paper addressed two major questions, namely: why the choice of a specific type of channel (the so-called disposers) proliferates, and what influences the probability of this choice. The major finding is that the preference for disposers persists because it is the most transaction-cost minimizing option. Farmers in this marketing set-up face better transaction attributes in terms of less asset specificity, frequency and uncertainty. This channel is characterized by long established relationships between the parties that foster trust. Employing logistic regression analysis, findings support the contention that transaction costs determine the channel choice decision. Specifically, negotiation and bargaining costs, and monitoring and information costs are the significant transaction costs that determine the choice preference. Increased ability of the farmers to perform price monitoring and increased trust of buyers, decrease the probability to market through the disposers. On the other hand, farmers' increased ability to price bargain and increased experiences of delayed payments increase the odds for preference of the channel. Hence, the paper has implications on actions that should be taken to improve the welfare of the vegetable farmers in the Cordilleras, Philippines.

Keywords: Transaction costs, New Institutional Economics, Channel choice, Vegetable marketing

C-35 Market Chain Analysis of Hybrid Corn in Sablayan, Occidental Mindoro

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Market chain is used to describe the numerous links that connect all the actors and transactions involved in the movement of agricultural goods from the farm to the final consumer. (Lundy, Gottret, Ostertag, Best, & Ferris, 2007).

This study was conducted to: (1) determine the corn farmer's socio-demographic characteristics; (2) identify the different agents/middlemen in the hybrid corn market and their characteristics; (3) identify the marketing functions performed by each key players/middlemen; (4) enumerate the different channels of hybrid corn; (5) determine the different margins and mark-up; and, (6) determine the problems encountered by the corn farmers and middlemen. Descriptive method of research was used in this study. Interview schedule using survey instrument and appropriate statistical tools were employed in data collection, analysis and interpretation.

Majority of the hybrid corn farmers are male and elementary graduate. They are in middle-aged and have medium household size and farm size. They also have long farming experience and low monthly net income. Agents/middlemen in the market chain of hybrid corn are barangay traders, private traders and cooperatives. They had short business experience and sell hybrid corn to Batangas feed mills. They are also engaged on buying and selling of rice and monggo as an additional business venture. All of the barangay traders performed assembly and financing, while private traders performed negotiation and financing. Moreover, cooperatives are also performing assembly, promotion and financing. Private traders negotiated to all market players in the market chain of hybrid corn; but the cooperatives have highest marketing margins among all agents/middlemen. Main problem encountered by the hybrid corn farmers is the low price of corn in the market; while the main problems of the agents/middlemen are low price of corn on the feed mills, erratic price fluctuation and classifying.

This study recommends the following: (1) hybrid corn farmers should be organized and encouraged to access information about the different agricultural technologies to increase their production, (2) strengthen the cooperatives and barangay officials in formulating programs that will help farmers to lesser their dependence on traders and chemical companies.

Keywords: market chain, hybrid rice, farmers

C-36 Supply Chain Improvement of Bamboo: Case of a Quasi-integration Model for Region I, Philippines

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This study was conducted to strengthen the supply chain of the bamboo furniture industry thru market matching following a quasi-integration model. Speciifically, it aimed to:(1) establish linkage between the bamboo stand owners and furniture manufacturers; (2) provide technical assistance to bamboo stand owners based on the product requirements of furniture manufacturers; (3) enable the pole producers increase their income through value-adding and value-creation; (4)improve access of bamboo stand owners to technical and market information; and (5) determine and analyze the existing policies on bamboo. The model employed clustering of farmers, capacity building, market matching, and policy analysis. The clusters were linked with furniture manufacturers through an overall cluster representative tasked to directly transact business with the furniture manufacturers. The cluster members were trained by technical experts on bamboo production and management, value adding and value-creation. Generally, through the quasi-integration model, the problems on supply, quality, and pricing of poles were addressed. Pole owners have access to complete information on product requirements and pricing. There is improved efficiency in the system of trading, reduced transaction costs and higher price of poles received by the farmers. It is imperative that existing policies on bamboo production, harvesting, and transport permits should be revised and updated. The market matching model should be sustained and replicated in other bamboo producing areas in the Philippines.

Keywords: supply chain, quasi-integration, bamboo furniture, farmer cluster, efficiency

C-37 Pest Management Practices of Herbs' Farmers in Malaysia

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Herbs have been used as supplement healthcare in Asian Nation and 70-80% of the world population rely on non-conventional medicine mainly of herbal sources in their primary healthcare. In Malaysia, herbs have been a part of the culture. The government has seen the importance of herbs, hence in 2009 it has identifies as one of the country's 12 National Key Economic Areas (NKEAs). The high demand of herbs has necessitated large scale cultivation of herb plants which is not possible to protect the crops without the use of pesticides. Repeated application of pesticide has negative impact on biodiversity and cause human health. During application, the pesticide can enter into the sprayer via inhalation, ingestion and dermal absorption. Uses of pesticide will also cause pesticide residues in plants. Pesticide residue contamination in food is the focused problem worldwide due to its direct implications on human health and international trade. In this study, herbs farmers were interviews to understand their pest problem and type of pest management practices. If the farmers are relying too much on pesticide, their product might give a harmful effect to the end-users due to high pesticide residue in product. A total of 125 various herb farmers were interviewed. The study found majority of herb farmers does not apply insecticide and fungicide and the integrated pest management is widely practices. The main reason of not apply the pesticide is due to less pest attack on herbs as the plant itself has repellent properties. However, herbicides is the main pesticide being used in herb farm as weeds are one of major problem in farms.

Keywords: Herbs, Pest, Pesticide

C-38 Factor Influencing Hygiene Practices towards Minimizing Aflatoxins Contamination in Peanut-based Products

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Aflatoxins are potent carcinogens that produced by fungi called *Aspergillus flavus* and *Aspergillus parasiticus*, which can contaminate in most agricultural commodities including peanuts. Aflatoxins contamination reduces the quality of peanuts, which can have adverse effect on health of human and animals. Peanuts are easily contaminated with aflatoxins because of improper storage condition, mishandling of peanuts, disregard of hygienic practices towards food handlers, and so forth. The negative effects of aflatoxins contamination are still not well addressed among food handlers and there is only a little knowledge about aflatoxins contamination among these stakeholders. There is a need to determine stakeholders' knowledge, attitude, and practices (KAP) towards aflatoxins contamination. The objective of this study was established to identify the

factors that influence hygiene practices in minimizing aflatoxins contamination in peanut-based products. Face-to-face interviews were conducted with 97 respondents which peanut-based manufacturers that located in Peninsular Malaysia using structured questionnaires. Stratified random sampling method was used to select the targeted respondents. Descriptive analysis, mean ranking analysis, and factor analysis were used in this study to analyze the information on hygiene practices to reduce aflatoxins contamination. The results revealed that storage, hygiene and training program, and material handling are the factors that significantly influenced in minimizing aflatoxins contamination in peanut-based products. It is recommended that peanut food industry need to provide proper training and programs for workers and also to implement good practices to ensure the safety of peanut-based products from aflatoxins.

Keywords: aflatoxins, food hygiene, food safety, peanut-based products, stakeholders

C-39 Capturing Size Restriction Model of Blue Crab for Improving Small Fishermen's Income and Resource Sustainability

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Blue crab is one of the fishery resource commodities that have high economic value. Market export for the commodities to different countries has been widely open. That has given significant contibution to the Indonesian economics and communities. So, it is importan to utilize and manage the resource optimally and sustainably in order to sustaining the economic benefit.This research aims to (1) estimate stock and level of capture of blue crab resorces; (2) evaluate the post harvest processing of blue crab; and (3) study financial feasibility of post harvest processing of blue crab based on size. Estimation of stock and level of capture of blue crabb resources are focued on the waters of Tangerang, Jakarta Bay, Bekasi, and Karawang. The evaluation of the utilization of blue crab was conducted in Dadap Village, Tangerang Regency. To estimate stock and capture level of blue crab resources in the loication is used bioeconomic model. To do the reserach and apply the the methodology, we purposively took a number of fishermen as respondences; and apply a census for processing unit and random sampling for blue crab processing system. To analize the data and achieve the reserach objectives, we applied Bioeconomic Gordon-Shaefer model, Analysis of Productivity, and Cost Benefit Analysis (CBA). Bioeconomic analysis results shows that the actual harvest is 1,152 tons per year. It means that the harvest has not exceeded the MEY level and overfishing has not occurred yet. So, the opportunity of increasing effort is possible. Post harvest processing of blue crab with size larger that 8 cm (≥ 8 cm) is more profitable than the smaller one and encourage a more stable stock of blue crab. It also shows an optimum crab production and increase efficiency of "mini plant" management in the long run. In order to control the optimum capturing size and encourage the processing plants do not accept and process crab smaller than 8 cm, the government policy must be strictly enforced, otherwise the sustainable blue crab resource management and improvment of fishermen income will be threatenned.

Keywords: Blue Crab capture level and size, Bioeconomic, Cost Benefit, post harvest processing

C-40 Impact Assessment of the Fish for Every Family Project in Occidental Mindoro, Philippines

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This study explores and assesses the impact of The Fish for Every Family Program (FFEFP), a program designed to promote and develop backyard tilapia fish farming in economically depressed areas in the Philippines. This program aims to address the issue of malnutrition among children by providing additional source of food. The main objective of this impact assessment study is to determine the contribution of the FFEFP in uplifting the lives of the families living in the selected depressed areas. It also seeks to determine the improvement in protein level of malnourished children and other family members as a result of access to tilapia project in their area.

This impact assessment of FFEFP was conducted in Occidental Mindoro. The researchers used purposive sampling to touch base directly with a representative sample of the FFEFP beneficiaries in three out of four municipalities in Mindoro Occidental. The data were gathered through focus group discussions with the key officials in the area and some tilapia cage culture technology adopters. Key informant interviews (KIIs) of all project stakeholders were also conducted. In order to validate the information gathered from the respondents and to see the fish farms used, field visits and ocular inspection were made.

The study revealed that the FFEFP has various impacts to the beneficiaries, adopters, and replicators of tilapia. Most of its impacts are related to economic and social development. Most of the participants of the program reported about the increase in their income. This helped them sustain their everyday needs, thus, prevent malnutrition among children. The program also helped them build stronger relationships among the members of the family and of the community. In addition, the study also revealed psychological and environmental impacts of the program to the people of some areas in Occidental Mindoro.

Keywords: fish farming, tilapia, malnutrition, protein, impact assessment

C-41 Preference and Consumption Pattern for Specialty Rice

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The study analyzed the consumption behavior for specialty rice (brown, red, and black) in selected towns of Laguna to know who the consumers of specialty rice are and their consumption pattern as well as the factors affecting such pattern. A total of 120 consumer-respondents were surveyed and data gathered were subjected to descriptive analysis, after-consumption attribute importance and differentiated importance rating analysis, and Chi-square testing. Results revealed that specialty rice consumers are generally younger, female, married, highly educated and high income earners. Specialty rice is mostly bought from supermarkets and the most common reason for buying is its being a healthy option. Brown rice had the highest average weekly consumption (5.76 kg), followed by red rice (4.75 kg) and black rice (4.5 kg). Among these three, brown rice was the cheapest (PhP54.47/kg) and black rice (PhP79.50/kg) was the most expensive. Based on attribute importance rating, aroma is the most important attribute that consumers look for in specialty rice while price and length of cooking time are the least important. However, differentiated importance measurement technique revealed that the motivating attribute for brown rice is the length of cooking time while for black and red rice it is price. Thus, development of appropriate processing techniques that would shorten cooking time was recommended. Also, consumer education on the benefits of specialty rice consumption was recommended to justify charging of a higher price for them. Chi-square test revealed that age and educational attainment were the significant variables affecting the consumption pattern of the consumers.

Keywords: consumption pattern, specialty rice, attribute importance rating, differentiated importance rating, consumer preference

C-42 Indonesian Broiler Competitiveness towards Asean Economic Community (AEC)

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Trade liberalization requires each country to have high competitiveness. Broiler industry is one of the sectors that need attention towards the implementation of AEC. The price and cost production of local chicken meat is higher than other countries. With the enactment of the AEC, local chicken meat would be threatened by cheaper imported product. This study aimed to analyze the competitiveness of broiler industry in Indonesia before and after the implementation of the ASEAN Economic Community by comparing the two types of cultivation, ie cultivation by small farms and by vertically integrated company. The analytical method used was the Policy Analysis Matrix (PAM). PCR and DRCR analysis showed that small farm has a competitive advantage, but does not have a comparative advantage. While the production by company has comparative and competitive advantages. It can be concluded that the production done by company has more competitiveness. The policy analysis indicates that overall policies is protective and give benefit to producers. There are three scenarios that are used to describe the competitiveness of broiler when AEC is enforced, the reduction of import tariffs, reduction of interest rates, and reduction in logistics costs. Meat import tariff reduction will lead to a decline in competitiveness. When import tariffs were eliminated, only the production done by company that remains competitive. While the reduction in interest rate and logistics costs will lead to increased competitiveness. The implementation of AEC will reduce competitive advantage but increase comparative advantage.

Keywords: AEC, Broiler, Competitiveness, Indonesia, Policy Analysis Matrix

C-43 Comparison Analysis of Characteristics and Profitability of Nutmeg Production in Bogor Regency, Indonesia

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Nutmeg productions in Bogor Regency, Indonesia are mainly divided into three groups of producers, such as nutmeg producers (farmers), nutmeg sweet producers, and nutmeg oil producers. Current rapid demand of nutmeg oil has changed the supply and demand system of nutmeg in the region. High price of nutmeg oil has brought competitiveness among sweet and oil producers, which led to shortage of nutmeg and high price of nutmeg fruits. On the other hand, this condition could bring benefits to farmers. However, only farmers with higher skill, capital and technology are able to process their crops into higher value-added products. This study is aimed to compare the production characteristics and analyze profitability among three

types of nutmeg producers (farmers) in Bogor Regency, in order to clarify the future prospect of sustainable nutmeg production. The study is done by interview survey conducted in 2012 and 2015 to collect primary data from 19 respondents, including 9 nutmeg producers (farmers), 4 nutmeg and sweets producers, and 6 nutmeg and oil producers. The result of this study shows that there are significant differences among each group of producers from the viewpoints of (1) production characteristics, (2) production scale, and (3) sales condition. The income analysis proves the importance of post-harvesting process to increase added-value of nutmeg as well as farmers' profit. It also clarifies that expanding production to include both self-sufficient supply of nutmeg and post-harvesting process could be the key to ensure sustainability of nutmeg production in Bogor Regency.

Keywords: nutmeg, post-harvest production, processed products, income analysis, added value

C-44 Input Elasticities and Economic Scale of Red Chilli in District of Garut, West Java, Indonesia

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District of Garut is one of the centers of curly chili production in West Java Province. Chilifarmers applied various fertilizers to produce the commodity: Urea, TSP, KCl, ZA, limestone, manure and liquid fertilizer, which can be substitutable between one and another, given the prices of those inputs. This study analyzes price elasticity of inputs in the production process of red chili in Garut, using a translog cost and Allen Uzawa elsticities of substitution approach. Totally 190 farmers in sub-districts of Cikajang, Cisurupan and Pasirwangi were surveyed using a stratified random sampling method. The results indicate that values of own-price elasticities and Allen-Uzawa elasticities were negatives, which are in-line with our expectation and economic theory. All cross-price elasticities and Allen-Uzawa substitution elasticities were inelastic, indicating that thought they are substitutable, in fact, one input cannot be easily replaced by another one. Value of cost elasticities is 1.37, indicating that a 1% increase in output will increase input cost by 1.37 percent. Finally, value of economic scale is 0.73, meaning that cost increases is at greater proportion than that of output.

Keywords: red chili, translog cost, cross price elasticities, Allen-Uzawa Elasticities (AES), economic scale

C-45 "Shakai Jisso": A New Trend in Practical Research to Benefit Society in the Field of Tropical Agriculture —SATREPS Projects As Case Studies

CANCELLED

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Recent research in tropical agriculture studies has taken somewhat of a new direction in Japan, with researchers working to address challenges in the field through hands-on research oriented toward problem- solving research, action research and collaboration research. This is in contrast to the more dominant trend of research aimed primarily at academic achievement. This new direction was partly motivated by researchers' desire for research outcomes to be of practical benefit to society rather than just serving research needs, but it also reflects a deeper awareness among researchers about significance of dealing with local (global) challenges and conducting research to solve specific problems.

The Science and Technology Research partnership for Sustainable Development (SATREPS), a program of Japanese government to promote international joint research, is a joint effort between the Japan Science and Technology Agency (JST) and Japan International Cooperation Agency (JICA). One of its primary objectives is to lead to research outcomes to practical benefit to society ("shakai jisso" in Japanese).

In this study, we select SATREPS projects as case studies for his type of research, clarify the kind of research results they aimed to achieve, examine technology transfers and extension activities, and look at how research outcomes are delivered to local communities.

Keywords: Shakai Jisso, SATREPS, technology transfer, extension activities

D-01 Effects of Physicochemical Factors and the Local Ecological Knowledge on The Population of Helicostyla Daphnis in Borbon and Sogod, Cebu

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Helicostyla daphnis, an arboreal snail endemic to Cebu was thought to be extinct, but was discovered to be still thriving and even eaten by people. In order to formulate strategies for the conservation of *H. daphnis*, a survey of the effects of

physicochemical parameters (relative humidity, surface soil pH, air temperature, elevation, and soil exchangeable calcium) and local ecological knowledge (LEK) on its population was conducted. On each of the nine plots in three sampling sites, physicochemical parameters were measured and a standardized direct search method for snails was used equivalent to a two hour sampling effort. LEK was gathered among fifteen snail hunting experts that were previously identified by their peers. Conversations with experts were freely conducted, giving opportunity to deeply explore each informant's knowledge. Independent t-test, One-way ANOVA and Pearson correlation were used to relate abundance to the physicochemical variables. Snail total abundance significantly varied across sites in the dry season ($p=0.006$), being highest at Barangay Cajel (Site 1), and least in Lugo (Site 2). Snails were found to be more abundant in the dry season than the wet (dry=306; wet=152) but the difference was only significant in Site 1. Adult snails were the most dominant among the age categories in both the dry and wet seasons, at 81% and 70% of the population sampled, respectively. Neonates, comprising 5% of the sampled population, were found only during the wet season. Relative humidity and air temperature seemed to be the major determinants of the total abundance of *H. daphnis.* However, LEK gathered about *H. daphnis* seemed to point out that overharvesting and habitat destruction brought about by snail hunting and gathering of fuel wood could be major determinants as well to the population status of *H. daphnis*. According to the experts, the harvesting of *H. daphnis* is generally for consumption, medicinal purposes, and commerce.

Keywords: Helicostyla daphnis, natural products, local ecological knowldege, tree snails, conservation

D-02 Fiberboard Made From Cultivated Leucaena and Rubberwood

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Fiberboard samples were produced using *Leucaena* wood and rubberwood. Two stages of *Leucaena* wood (3 and 5 year-old), three types of ratios (20:80, 50:50 and 80:20) and three level of resin contents of 15%, 18% and 20% were used in this study. For fiberboard samples made from rubberwood mixture with 3 year-old *Leucaena,* with an increment of ratio of *Leucaena* wood from 20:80 to 80:20, the mechanical properties (MOR, MOE and IB) exhibit an increasing trend but for physical properties (TS) showed decreasing trend. Mechanical and physical properties of board samples from 3 year-old *Leucaena* wood also shows positively correlated with increased of resin content. Results of fiberboard made from mixture of rubberwood with 5 year-old *Leucaena* wood shows increased in mechanical properties when increase ratio of *Leucaena* wood from 20% to 80% except for internal bond (IB). Most of fiberboards made from rubberwood which mix with 3 year-old of *Leucaena* wood had meet the requirement of JIS standard for mechanical properties [A 5905 (2003)] except board treatment from ratio of 50:50. Fiberboard made from mixture of rubberwood and 5 year-old of *Leucaena* already passes the minimum requirement of JIS standard except MOR and thickness swelling from board treatment with ratios of 20% *Leucaena* wood. Generally, 3 year-old *Leucaena* wood with low resin content (15%) was already appropriate to manufacture fiberboard.

Keywords: Leucaena wood, Rubberwood mixture, Fibreboard

E-01 Production Performance of Backyard and Commercial Goat Farms in Central Luzon, Philippines

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Central Luzon ranks 5th among the most important goat producing regions in the Philippines, hence it was included in a national program to monitor data on goat farm performance using a unified recording system. There were 55 backyard and 5 commercial farms studied. Selected performance parameters were monitored for 2.5 years, consolidated by farm type and on yearly basis to determine spatial and temporal differences. The 2.5 year mean values of goats' growth and reproductive performance for Central Luzon were compared with the national mean values.

Kidding interval of goats raised under backyard farms is shorter at 225 days while kidding index was higher at 1.62 than the national mean at 251 and 1.5, respectively. However, growth parameters indicated that goats in the region are smaller. Birth weight is about 1.6kg and weight at 8 months is 14.6kg, lower than the national average by 0.18kg and 2kg, respectively. Mortality among less than 1 month old kids was higher than the national mean by 6%, but lower for other physiological stages. Meanwhile, the reproductive and growth performance of goats under commercial farms in the region is at par with other farms in the country. Kidding index is almost the same at 1.4, and weights at birth and at 8 months are not significantly different with the national value at 1.6kg and 20kg, respectively. Based on these factual data, technological gaps and technological options were identified as basis for future R&D plans to improving farm performance.

Keywords: Philippines, goat, backyard, performance, unified recording system

E-02 Rural Enterprise Development through Innovative Goat Production Systems in Nueva Ecija, Philippines

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The Rural Enterprise Development (RED) project was implemented in Guimba, the focal site, and in Science City of Muñoz, control site, in the province of Nueva Ecija, Philippines. The project aims to transform subsistent goat raising into a viable livestock-based enterprise. Baseline data on biophysical, socio-economic, institutional, infrastructure, goat production systems and performance, and marketing practices were determined using participatory rural appraisal (PRA) and focus group discussion (FGD). Farmer-partners from the focal sites received technological intervention in goat farming. Their knowledge, skills and social competence were enhanced through capacity building and S&T intervention.

Goat raising is the primary goat-based enterprise in the focal and control sites. The farmer-partners were trained on the different technologies such as upgrading, stall feeding, strategic deworming, and intensified use of forage legumes. Their adoption of these technologies improved farm performance. To sustain goat productivity, a community-based breeding project was established as an enterprise. Appropriate genetic selection and breeding system were initiated. Upgrading using Anglo-Nubian or Boer bucks in the focal sites produced bigger and heavier ($p < 0.05$) kids at birth (2.3 kg), at weaning (13.86kg) and at slaughter (21.46kg) than those raised in the control site. Pre-weaning mortality was lower ($p < 0.05$) at 12.46%, kidding interval was shorter ($p < 0.05$) at 8 months with conception rate of 89.23%.

RED improved goat productivity and facilitated the development of profitable enterprise in the community. Therefore, RED is not just about successful science-based goat raising, it is about building enterprises and generating opportunities for smallhold farmers.

Keywords: goat, technology, rural enterprise, performance, Philippines

E-03 Strategy of Beef Cattle Development Based on Agricultural By Product (Study in West Java, Indonesia)

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Development of beef cattle based on agricultural by product will be created with an appropriate strategy in West Java Provinces, it was an attempt to fullfil meat requirement. West Java province is one of provinces that have potential for agricultural by product. The aim of research was to indentify potential of agricultural by product and characteristics of farmers in West Java. Research was conducted in two districts in Kuningan and Cirebon in West Java. Study used two types of data such as primary data and secondary data. Primary data was obtained from interview with respondents and nutrient composition data from laboratory analysis. Interview and sampling of agricultural by product carried out in three sub districts for each district with 10 respondents each sub district. The results showed that agricultural by product in West Java were rice straw, corn straw, banana peels, straw sweet potato and peanut hay. The highest potential of agricultural by product is rice straw. Farmers in West Java perform maintenance using traditional system. Beef cattle that could be developed based on rice straw as rouhages sources in West Java number 25 576 AU and 1 455 AU for other straw. The conclusion showed that strategy to developmet of beef cattle are (a) using local feed resources as main feedstuff for beef cattle, (b) to educate farmers a simple feed technology how to maintenance and improved nutrien quality of local resources, and (c) to open mind farmers that animal livestock for profit oriented and economic welfare.

Keywords: agricultural by product, beef cattle, West Java

E-04 Study on Physical Characteristic of Commercial Broiler Feed in Thailand

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A present study was conducted to determine the physical characteristic of broiler feed manufactured in Thailand. Feeds in the starter, grower, and finisher periods were randomly sampled from ten feed mills for the analysis of feed form, density, fine percentage, pellet length, pellet size, hardness, and standard pellet durability index (PDI). The results showed that eight from nine of feed mills produced starter diets as crumble feeds, but the rest produced in form of pellet. The range of fine percentage was 10.15-85.58 and the density was 59.50-73.66 g/100 ml. For the grower diets, the pellet feeds were manufactured from nine feed mills, and one of ten feed mills produced crumble feed. The physical characteristics of fine and PDI were found in the

range of 3.86-26.73% and 69.06-94.56%, respectively. In addition, values of fine portion, PDI, and hardness of the finisher feed samples were 2.39–18.68%, 78.54-95.43% and 1.13-3.90 kgf., respectively. These findings indicate that the physical characteristic of broiler feeds varies among feed mills. These differences in physical characteristics are possibly influenced by the factors of diet formulation, particle size of feed ingredients, conditioning process, die specification and cooling and drying process.

Keywords: physical characteristic, pellet, crumble, broiler, feed

E-05 Egg Hatchability, Egg Qualities and Profitability of Diverse Native Chickens Raised in Varying Confinement Spaces & Levels of Pili (*Canarium ovatum*) Pulp in The Laying Ration

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Smallholder Native chicken production is regarded to be one of the indigenous resources to answer protein needs and source of income of underprivileged population in the Bicol Region, Philippines. Recommendation of native chicken raising must be on free range but a 0.5m^2 per bird is recommended if ranging is not possible (PCAARRD, 2007). Range-confinement space requirement per bird and strategic feeding must also be presented to protect animal life environment with comfort. Study was conducted to determine the percentage hatchability, external & internal egg quality, and profitability using 180 diverse native hens and 36 roosters kept with 1.0m^2, 1.5m^2, and 2.0m^2 per bird range-confinement space requirement. Common health and feeding management was practiced. Home-mixed laying ration with varying levels of 0, 15, 30 and 45% pili pulp meal was given. The experimental hens & roosters were laid in factorial in completely randomized design replicated three times with 5 hens and 1 rooster. One hundred eight eggs were used to determine external and internal egg qualities.

Significant results were observed to be affected by ration, confinement and interaction on the percentage hatchability**,** egg length**,** egg index**,** egg yolk height and width**,** yolk and albumen weight, and albumen height, while egg shell thickness, egg width**,** egg-hatched was affected by the ration, and confinement.

The performance of native chickens was affected by pili pulp meal levels at 45% pili pulp meal levels and confinement at 1.5m^2 to 2.0m^2 per bird. The % return of investment was better in 1.5m2 space per bird and 45% pili pulp meal in the ration.

Keywords: Native chicken, Egg Hatchability, Egg Qualities, Range-Confinem Pili (Canarium ovatum) Pulp Meal, Egg Hatcability, Egg Qualities, Range-confinement space,pil (Canarium ovatum) Pulp Meal

E-06 Performances of Gestating Sows of Different Parities and Breeding Batch in Houses With and Without Evaporative Cooling System

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The study aimed to identify the effects of breeding batch, parity and housing improvement on sow productivity performance (n=266). Improvements were assessed using their performance records for February-October 2014. Two groups of sows were selected, one held in conventional housing (n=142) while the other housed with evaporative cooling system (ECS) (n=124). Sows in first, third and sixth parities were then chosen for the set-up selected. Records were further divided into two breeding batches, based on the month the sows were bred: February-March and April-June. Temperature Humidity Index (THI) was computed for each of the breeding batch and house for comparison. THI ranges for first and second batch during gestation period were 73-79 and 76-83, respectively. Highest value for birth weight (BW) in kilograms ($P<0.05$) were observed at sows with third parity while highest number for total pigs born (TPB) ($P<0.05$) and litter size born alive (LSBA) ($P<0.05$) came from sows with sixth parity. Significantly shorter weaning to estrus interval (4.73d vs 6.33d) in sows housed with ECS, having a relatively cooler condition compared to conventional housing was observed in the first breeding batch. Interaction of parity and housing shows significantly higher BFTW on sows only with first parity housed with ECS compared to sows in conventional house (21 vs 15mm). Based on the results, it can be suggested that ECS is only effective for THI≤73 and sows with first parity.

Keywords: sows, evaporative, cooling, system, parity

E-07 Immunostimulant Effect of andrographis Paniculata Nees Extract Methanol to Leucocyte Differentiation Broiler Infected Eimeria Tenella

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Avian coccidiosis is economically the most important parasitic disease of the poultry industry and caused by intestinal infection with *Eimeria tenella.* Due to increasing regulations with the use of prophylactic drugs and escalating consumers'interest on naturally-raised chickens, much interest has been devoted toward the development of alternative strategies control avian coccidiosis. In order to study the effect of *Andrographis paniculata* Nees extract methanol on leucocyte differential broiler after experimental infection with *Eimeia tenella.* One hundred and twelve one-day –old Cobbs were placed in floor cage until 14 days. After 14 days chicken were randomly assigned to seven experimental groups consisting of 16 chickens per group with four replicated per treatment. Chicks were fed a basal diet without antibiotic and anticoccidiostat. All birds were inoculated orally with sporulated oocysts of *Eimeria tenella* $1x10^5$ on day 14. Four groups each received oral treatments with *Andrographis paniculata* methanol extract with dose of 90, 180, 360mg/kgbw, sulphachloropyrazin with dose of 180mg/kgbw. One group was infected but not received treatment. Two groups were remained uninfected but received oral treatment of placebo and 180mg/kgbw. The blood was collected before infected, 3rd, 6th, and 9th day post infection for blood films which were stained with Giemsa. One hundred of leucocyte were differentiated into heterophils, monocytes, lymphocyte, eosinophils, and basophils.The results showed that chicken infected with *Eimeria tenella* increased percentage of monocytes, heterophils, and eosinophils, otherwise increased lymphocytes at 3rd, 6th, and 9th day post infection. Treatment with *Andrographispaniculata* methanol extract after infection decreased the percentage of heterophils in the blood at 3rd, 6th increased at 9th day post infection compare to group of chicken infected without treatment. Percentage of monocytes decreased at 3rd, 6th, and 9th day post infection. The lowest percentage monocytes was treatment with *Andrographis paniculata* methanol extract 360 mg/kgBW. The percentage eosinophils increased at 3rd, 6th, and 9th day post infection in provision *Andrographis paniculata* methanol extract 90 and 180 mg/kgBW. Conversely decreased in provision *Andrographis paniculata* methanol extract 360 mg/kgBW at 3rd, 6th, and 9th day post infection. Percentage of lymphocytes increased higher at 3rd, 6th, and 9th day post infection at treatment with *Andrographis paniculata* methanol extract level 360 mg/kgBW.
Conclusions of this study was the *Andrographis paniculata* methanol extract 360 mg/kgBW has properities as immunostimulant by increased lymphocytes and decreased heterophils, monocytes, eosinophils.

Keywords: Andrographis paniculata Nees, heterophils, monocytes, lymphocytes, Eimeria tenella

E-08 Colostral Immunity against Classical Swine Fever and Aujeszky's Disease Derived by Oral and Suckle in Piglets

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Two experiments for the comparison of colostral immunity against classical Swine Fever and Aujeszky's Disease derived by oral and suckle in piglets were done. The two crossbred (Large White X Landrace) sows and three crossbred (Large White X Landrace X Duroc) piglets were used for both experiments. In the first experiment, eighty suckling piglets were divided into 2 groups. The control group with 40 piglets suckled colostrum from the dam on usual way and the treatment group with 40 piglets was orally administered with 30 ml of colostrum. The s/n titer of Swine Fever disease and Aujeszky's disease at 3 and 5 weeks after farrowing were determined. Result shows that s/n titer of Swine Fever at 3 and 5 weeks of age has no statistically significant difference ($P>0.05$) between two treatments. The Aujeszky's disease titer at 3 week was not significantly different ($P=0.05$) and at 5 weeks of age showed no significant difference ($P>0.05$) between treatments. Average daily gain (ADG) at weaning period of piglets was not significantly different ($P>0.05$) between treatments.
In the second experiment, sixty suckling piglets were divided into 2 groups. The colostrum was manually collected (by hand) within 6 hours after farrowing and was separated into 3 parts. The first treatment with 30 piglets was orally administered with one part of colostrum. The second treatment with 30 piglets was orally administered with two parts of colostrum. The s/n titer of Swine Fever disease at 6 hours after farrowing, 3 week of age and 6 week of age of piglets, were determined respectively. Result shows that the s/n titer of Swine Fever disease in piglets at 6 hour was significantly different ($P<0.05$) but showed no significant difference ($P>0.05$) at 3 and 6 weeks of age between treatments. The ADG of piglets at weaning was not significantly different ($P>0.05$) between treatments. The two experimental studies conclude that piglets orally administered with colostrum do not affect immunity at 3 and 6 weeks of age against Swine Fever and Aujeszky's diseases respectively and ADG at weaning.

Keywords: Orally Colostral, Immunity, Classical Swine Fever, Aujeszky's Disease, Piglets

E-09 Evaluation of Staphylococcus Aureus and Escherichia Coli Caused Mastitis and Hygiene Control in Milking Process by Using Duplex Polymerase Chain Reaction Technique.

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Polymerase chain reaction (PCR) is an in vitro technique for the nucleic acid amplification, which is commonly used to diagnose infectious diseases in human and animal. To design a duplex PCR for rapid and simultaneous detection of *Staphylococcus aureus* and *Escherichia coli* caused mastitis in swab samples during milking process and compare PCR technique with culture methods. Seventy-two samples were collected from suspicious points during milking process. All samples were cultured in mannitol salt agar and mac-conkey agar specific media for *S.aureus* and *E.coli*, respectively. Both species were identified by using microbiological methods. PCR assay were performed, using two primers that could simultaneously identify and differentiate species of mastitis-causing bacteria in bovine. Of the 60 samples tested, 24 sample (40%) showed positive reactions in mannitol salt agar specific media for *S.aureus* and 25 sample (41.67%) were positive in mac-conkey agar specific media for *E.coli.* 15 sample (25%) showed positive reactions in duplex PCR. 23 samples were positive for *S.aureus* (38.33%), 36 for *E.coli* (60%). Generally, use of the molecular technique duplex PCR in addition to increased speed and accuracy and less false results than bacterial culture method, is able to identify different species of mastitis-causing bacteria in bovine. This will facilitate the treatment process.

Keywords: Staphylococcus aureus, Escherichia coli, Mastitis, Milking Process, Duplex PCR

E-10 Kamphaeng Saen Synthetic Thai Beef Cattle Breed

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The Kamphaengsaen (KPS) beef cattle is the first Thai beef breed registered in Thailand. Since 1969 by a group of animal scientists from Kasetsart University (KU) is the first registered in Thailand. With The long-term research genetic improvement and performance testing of KPS bull project. The breed is a composite breed of 25% Thai native cattle breed, 25% Brahman and 50% Charolais exotic breeds. The KPS beef breed formed by inter se-mating of D1 then D2, D3 and D4 were crossed and KPS Beef Breeders' Association was founded to register the breed. The economic traits performance testing of KPS cattle has been conducted from records of young bull after weaning at 7-8 months old from cattle farm members across the country. The KPS bull calves were testing station and kept in individual pens under the same management and feeding system for 120 days. These traits were weighted according to relative importance in selection of each bull for kept frozen semen. The numbers of KPS bulls of D1, D2, D3 and D4 group used for performance testing were 159, 154, 38 and 28 respectively. The results of average birth weight, adjusted 205-day weight, average daily gain (ADG), feed conversion ratio ratio (FCR) and Grade point average(GPA) ($P<0.05$) of KPS bull D1 group were the best compared to D2 D3 and D4 group. However, Body length, Hip height and Testicle circumference were not significant different ($P>0.05$).The results indicate KPS bull D1 is of the most efficiency for feedlot to commercial.

Keywords: Kamphaengsaen beef cattle, Performance testing, ADG, FCR

E-11 Study of Steroid-based Program for Synchronizing Ovulation on Reproductive Performance of Brahman X Thai-native Crossbreed and Kamphaeng Saen Cows

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The use of steroid-based program for synchronizing ovulated to improve the efficiency of artificial insemination. This research aimed to study of steroid-based program for synchronizing ovulation on reproductive performance of Brahman x Thai-Native crossbreed and Kamphaeng Saen cows. In the experiment fifty-nine cows were divided 2 treatment groups according by breed of cows. Group 1, Brahman x Thai-Native crossbreed consisted of 23 cows. Group 2, Kamphaeng Saen consisted of 36 cows. The results between Brahman x Thai-Native crossbreed and Kamphaeng Saen cows on body condition score, size of ovary, size of preovulatory follicles, respond of uterous at AI time and conception rate were not statistic significantly difference ($P>0.05$). Kamphaeng Saen were lower percentage of return to estrus than Brahman x Thai-Native crossbreed cows ($P<0.05$). These suggested that use of steroid-based program for synchronizing ovulated have efficiency on conception rate to 40% in Brahman x Thai-Native crossbreed and Kamphaeng Saen cows.

Keywords: Synchronizing ovulation, Reproductive performance, Brahman x Thai-Native crossbreed cow, Kamphaeng Saen cow

E-12 Influence of Age on Frozen Semen Quality of Kamphaeng Saen Bulls

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The age of bull had effect on fertility, semen quality and production of bovine frozen semen. This study was aimed to investigate effects of age on frozen semen quality of Kamphaeng Saen bulls. Fourteen Kamphaeng Saen bulls were divided into 3 groups according by the age. Group 1, two years of age consisted of 5 bulls. Group 2, three years of age consisted of 5 bulls. Group 3, four years of age consisted of 4 bulls. Kamphaeng Saen bulls were collected semen and produce frozen semen. The results showed velocity of sperm in group 1 and 3 higher than group 2 ($P<0.05$). There were no significant difference ($P>0.05$) on percentage of motile sperm, progressive movement and curve-line movement of sperm. Therefore the results not indicated the age which had the best to produce frozen semen but the results suggested can produce frozen semen since two years of age from Kamphaeng Saen bulls.

Keywords: Age, Frozen semen quality, Kamphaeng Saen bull

E-13 The Effect of Different Combination of Boiled and Unboiled Tomato Waste in Diet on Broiler Performance and Blood Serum Lipoprotein

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Lycopen in tomato waste could be a potential natural statin source for lowering cholesterol in broiler. Boiling tomato waste in boiled water for 10 minutes can change the lycopen structure from trans to cis form. Cis lycopen is absorbed easily by animal digestive truct. An experiment was performed to evaluate the effect of different combination of boiled (BT) and unboiled (UT) dried tomato waste in broiler diet. Experiment was arranged in Completely Randomized Design with 6 different combination of boiled and unboiled tomato wastes (0 %., 25 UT % : 75 BT %., 50 % UT: 50 % BT., 75 % UT: 25 %BT., 100 % UB., 100 % BT) in broiler. Each treatment was replicated for 5 times. Measured parameters were feed consumption, average daily gain, feed convertion, organ development (weight of: heart, liver, pancreas, gizzard, small intestine, and spleen), and lipoprotein (Total of Cholesterol, HDL, LDL and Triglyseride) in broiler blood serum. The result showed that feed consumption, average daily gain, feed conversion, development of gizzard, pancreas, heart, spleen, liver were not affected significantly ($P<0.05$) in every dried tomoto waste combination, while the weight of small intestine was significantly $P>0.05$) affected. Total of cholesterol, LDL and trigliseride were affected significantly ($P>0.05$), and HDL was not affected in every -treatment ($P>0.05$). In conclusion, the inclusion of 100% boiled dried tomato waste in broiler diet could maintain the broiler performance, lowering Cholesterol, LDL and Trigliseride and maintain the HDL of blood serum and organ development of broiler.

Keywords: tomato waste, broiler, performance, lipoprotein, organ development

E-14 Durian Fruit Waste Fermented by Phanerochaete Chrysosporium and Neurospora Crassa in Quail Diet: Effects on Laying Performance and Egg Quality

CANCELLED

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An experiment was conducted to determine the effect of feeding durian fruit waste fermented by *Phanerochaete chrysosporium* and *Neurospora crassa* on laying performances and egg quality of laying quail. This experiment was arranged in a completely randomized design with fife dietary treatments: 0%, 5%, 10%, 15% and 20% durian fruit waste fermented by *Phanerochaete chrysosporium* and *Neurospora crassa* in the diets and five replications. 200 laying quail *Coturnix coturnix japonica* (7 week of age) were randomly allocated into 5 treatments (10 birds per treatment) and 4 replications. Diets designed iso nitrogen 20% and iso metabolism energy 2800 kcal/kg. Results of the experiment indicated that feed intake, quail day production, egg weight, egg mass production, feed conversion were not affected ($p>0.05$) but egg cholesterol and egg yolk colour were affected ($p<0.01$) by increasing durian fruit waste fermented products in the diet. Egg cholesterol was the lowest but egg yolk colour was the highest at treatment utilization 20% durian fruit waste fermented than others. Conclusion of the experiment that utilization 20% durian fruit waste by using *Phanerochaete chrysosporium* and *Neurospora crassa* maintained laying performance of quail, reduced egg cholesterol 32.11% and increased egg yolk colour 20.56%.

Keywords: Durian fruit waste, Phanerochaete chrysosporium, Neurospora crassa, quail laying performance, egg quality

E-15 The Effect of L-methionine Replacement on Broiler Performance and Carcass Trait.

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An experiment was conducted to determine the effects of L-Methionine on broiler performance and carcass traits. In randomized completely block design: 1600-day old, Ross 308 chicks were subjected to four dietary treatments: Treatment 1 (the control diet)with DL-Methionine supplementation up to the recommended industrial levels of methionine and total sulfur amino acids in the diets, and Treatments 2, 3, and 4 with L-methionine 95,90, and 85 percentages replacement of added DL-Methionine in the control diet. Each treatment consisted of 8 replications (4 for males and 4 females) with 50 broiler chicks per pen. All the chicken were fed three phase feeding program from 1-10 DOA (Starter), 11-24 DOA (Grower), and 25-35 DOA (Finisher) . The diets in mash form and water were provided *ad libitum* throughout the experiment. At day 35th, five birds from each pen were sacrificed for the carcass traits determination.

There were no significant differences among dietary treatments on weight gain, feed gain ratio, the amount of feed consumed and mortality from the periods of 1-10, 11-24, 25-35, and 1-35 DOA. No negative effects of L-Methionine at the levels of 95, 90, and 85 percentages of DL-Methionine were observed in carcass traits compared to the control group. Under the condition of the study, dietary DL-Methionine supplementation can be replaced by only 85 percentages of L-methionine in broiler diets without any detrimental effects to broiler performance and carcass traits.

Keywords: Broiler, Carcass Traits, DL-Methionine, L-Methionine , Performance

E-16 Effects of Different Phase Feeding Program and forms of Feed on Broiler Performance and Carcass Traits

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An experiment was conducted to investigate the effect of different phase feeding program and forms of feedon broiler performance and carcass traits. A total of 880 male and female broiler chickswere either fed with Crumble (C) or Pellet (P) dietsat the different phase feeding program[Starter (S), Grower (G), and Finisher (F)]. Four dietary treatments were Treatment 1: CS 1-7, PG 8-33, PF 34-37 days of age; Treatment 2: CS1-10,PG 11-33, PF 34-37 days of age; Treatment 3: CS 1-14, PG 15-33, PF 34-37 days of age and Treatment 4: CS 1-17, PG 18-33, PF 34-37 days of age. There were no significant differences among dietary treatments in body weight gain, feed consumption, feed gain ratio, and mortality during starter, grower, finisher, and overall periods. The differences in phase feeding program and forms of feed also had no effects (P>.05) on theweights of carcass, breast, thigh, drumstick, wings, shanks, liver, gizzard, heart, and abdominal fat at 37 DOA. Under the condition of the study, changing forms of feed from crumble to pellet at 8 DOA had no detrimental effects on broiler performance and carcass characteristics.

Keywords: feed forms, phase feeding program, broiler, performance, carcass traits

E-17 Glycerol-a Great Potential Source of Energy for Layer

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The aim of the study was to investigate the use of purified glycerol from biodiesel production as energy feed-stuff for layer. Purified glycerol is used for drug and cosmetic production. It is also suitable for food and animal feed. Purified glycerol contains 99%wt up for glycerol content, less than 0.01%wt of methanol, 3842-4118 kcal/kg of gross energy and 3,352 kcal/kg ME for poultry. Therefore, the purified glycerol has a high potential for energy feed stuff for domestic animals.The study on productive performance was conducted to determine the use of purified glycerol in layer diet.A total of480,24 week of age,Lohmann Brown were divided into 4 treatments including, corn-soy basal diet (CS), CS with 2.5% of glycerol,CS with 5.0% of glycerol and CS with 7.5% of glycerol, respectively. Each treatment consisted of 10 replications with 12 birds each. All diets were isocaloric and isonitrogenous (2,750 kcal/kg , 17.5%CP). Birds were raised in an evaporative system for 4 periods, 28 days per period. There was no significant difference in feed intake, hen house production, hen day production and egg weight in each period. The result revealed that purified glycerol can be used in layer diet at 7.5% without a negative effect on productive performance.

Keywords: Glycerol, gross energy, metabolizable energy, energy source

E-18 Determination of Phosphorus Digestibility of Mono-dicalcium Phosphate, Monocalcium Phosphate and Dicalcium Phosphate in Broiler Chickens

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A study was conducted to determine the preceacal digestibility of phosphorus (pcdP) of mono-dicalcium phosphate (MDCP), monocalcium phosphate (MCP) and bone dicalcium phosphate (DCP) in broiler chickens using the regression method. Basal diet was formulated to contain 0.25% total P and each of test ingredients was supplemented into the basal diet to create 3 experimental diets (0.30, 0.35, 0.40% total P, respectively). A total of 10 dietary treatments were used in this study. The total Ca to total P ratio in all diets was maintained at 1.3:1 by the addition of limestone. A total of 360 male broiler chickens at 21 day of ages were assigned into the dietary treatments with 6 replicate cages (6 birds per cage). Birds were fed with experimental diets for 8 days. At 29 day of ages, all birds were sacrificed and ileal digesta were collected from the posterior half of ileum. The pcdP were calculated for each diets and replicated cage. The pcdP was plotted against total P concentration in a linear regression analysis. The slope of the regression line gave the coefficient of precaecal digestibility of P from the supplemented source. The analyzed concentrations of P increased with raising inclusion levels of MDCP, MCP and DCP in the diets and were in agreed with the calculated values. Coefficients of prececal digestibility of P in MDCP, MCP and DCP were 0.59, 0.65 and 0.69, respectively. The present study indicated that the digestibility of P in MDCP, MCP and DCP are much lower from the available values currently used.

Keywords: digestibility, mono-dicalcium, phosphate, monocalcium phosphate, dicalcium phosphate, broiler

E-19 Organoleptic and Physical Characteritics of Milk From Moringa-fed Buffaloes

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The physical characteristics of raw buffalo milk from two treatments (T1- Control and T2 – 30% MoLM) were evaluated using sensory evaluation and were compared to the Philippine Carabao Center (PCC) standard. Raw milk from experimental buffaloes in feeding trial was subjected to sensory and physical evaluation. Experienced panel from PCC evaluated the milk using simple normal sensory characteristics: aroma, color, appearance and flavor. Results of the study showed that both Treatments produced milk that are of white color, no off odor to slight off odor, homogenous, milky and sweet flavored and slight to moderate thickness. There was a slight difference in milk pH, temperature, sweetness and specific gravity. The same values were obtained in total titratable acid (lactic acid) in both Treatments 1 and Treatment 2. No significant difference between the treatments was noted. Milk produced was ideal for the processing into any or all dairy products.

Keywords: physical characteristics, sensory evaluation, aroma, raw milk, total titratable acid

E-20 The Using of ß-galaktosidase Enzyme From Enterobacter Cloacae to Produce Low Lactose Uht Milk.

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The Research of the using of ß-Galactosidase enzyme from *Enterobacter cloacae* to produce low lactose UHT milk has been conducted to determine the activity of ß - galactosidase hydrolyze lactose in milk. The activity of ß-galactosidase enzyme can be hydrolyzing the lactose into glucose and galactose so that it is able to reduce of the lactose content of milk. It can aid the availability of low-lactose dairy products in order to cover the lactose intolerant sufferers. The method was used in this study is the experimental method by 8 replications, while the data were analyzed descriptively. Variables measured include: production of ß-galactosidase enzyme, ß-galactosidase enzyme activity in hydrolyzing lactose and lactose content of milk UHT. The results showed that the addition of ß-galactosidase enzyme into UHT milk has increased its activity in hydrolyzing lactose into glucose and galactose, which is followed by decreasing lactose level of UHT milk.

Keywords: ß-Galaktosidase, enzyme, Enterobacter cloacae, lactose, UHT milk.

E-21 Identification of Quantitative and Qualitative Characteristics of Pitalah Ducks at in-situ Area As Genetic Resource of Local Poultry in Indonesia

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Research was conducted at Batipuh district, Tanah Datar Regency, West Sumatera Province, Indonesia. A semi-structured questionnaire was administered to one hundred and fifty selected households engaged in Pitalah Ducks cultivating in the study area. The aim of this study was to determine the qualitative and quantitative characteristics of adult ducks pitalah in situ region, district Pitalah. This research was conducted through a survey method. Two hundred and seventeen Pitalah adult ducks have been observed and measured qualitative and quantitative characteristics in detail. Qualitative characteristics include the color of feathers on the head, neck, chest, back, wings, thighs, and tail; and the color of beak, shank, skin, and eggshells. Quantitative characteristics include body weight; length and width of the beak; height and length of the head; length of the neck, back, wings, tibia, femur, shank, and third finger; and diameter of the shank. The results showed that the majority Pitalah duck's feather color was black on females and gray to black with dark green on the wing tips on males. Beak and shank color was black, while the skin color was gray. Duck adult weight varies from 1,100 to 1,800 g. Ducks Pitalah have medium body with upright inclined position. The size of body parts varies with the degree of variation is medium, so the opportunity to be selected.

Keywords: Pitalah ducks, Qualitative, Quantitative, Characteristics, Germ Plasm

E-22 The Haematological of Lactation Buffalo Fed a forage Based on Local Feeding As Feed Supplement

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The research aims to determine the effect of feed supplements of cassava leaves, gamal leaves and katuk leaves ((*Manihot esculanta Crantz*, *Gliricidia sepeum* dan *Sauropusandrogynus* (L.) Merr) on the haematological of lactation buffalo. In the study was used of 4 lactation buffaloes in Kanagarian Pamatang Panjang, Sijunjung District-West Sumatera. The design of the experiments used was a Latin square design consisted of four treatments and four replication/block. The treatment were without feeding supplements (A), cassava leaves (B), gamal leaves (C) and katuk leaves (D) respectively of 5 kg / head / day. The variables measured were haematological of lactation buffalo that consisted of the number of haemoglobin, erythrocyte, leukcocyte and haematocrit. The results showed that feeding supplements of cassava leaves, gamal leaves and katuk leaves as much as 5 kg / head / day very significantly increased the number of haemoglobin, erythrocytes and haematocrit, but does not affect the number of leucocytes lactation buffalo

Keywords: cassava leaves, gamal leaves, katuk leaves, buffalo, haematological

E-23 Effect of Probiotic Feeding on Weight Gain, Blood Biochemical and Hematological Indices of Crossbred Dairy Goat Kids

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The study was conducted to evaluate the effect of probiotic feeding on weight gain, blood biochemical and hematological indices of crossbred dairy goat kids. Sixteen (16) crossbred Anglo-Nubian x Saanen dairy goat kids, 3 to 4 months old, ranging from 19 to 23kg were randomly assigned into four treatments orally fed with $5x10^9$ cfu/ml probiotic supplements; Treatment 1 – control; Treatment 2 – two strain of lactic acid bacteria (*L. plantarum BS and P. acidilactici 3G3*); treatment 3 – *S. cerevisiae 2030*; Treatment 4 – multi-strain probiotics (*L. plantarum BS, P. acidilactici 3G3, and S.cerevisiae 2030*). Daily ration of the individual animals consisted of 1kg concentrate mixed feed ((*Leucaena leucocephala* dried leaves and pollard), 2 kg fresh *Pennisetum purpureum* ,and 2 kg *Gliciridia sepium* leaves. The experimental feeding trial lasted for 9 weeks. Results revealed that treatments orally fed with probiotics had significantly ($P \leq 0.05$) higher weight gain compared to the control. Significant effect on plasma urea nitrogen (PUN) and triglyceride were noted during 30^{th} and 60^{th} day of probiotic feeding. White blood cell counts were significantly affected by probiotic feeding during the 60^{th} day. While the concentrations of glucose, red blood cells and hemoglobin remained unchanged throughout the experimental period. The findings suggests , under the condition of the experiment, that live probiotic feeding could have a significant role in improving weight gain and metabolism of crossbred dairy goat kids.

Keywords: blood biochemial, hematoligical indices, probiotics, weight gain

E-24 Effect of Crude Glycerin Level in Dairy Cow Diets on in vitro Gas Production

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The objective of the study was to assess impacts of increasing dietary levels of glycerin using *in vitro* gas production and kinetics. Total mixed rations (TMR) of dairy cow consisted of 6 levels of crude glycerin (0, 4, 8, 12, 16 and 20%) that replaced cassava chips. TMR containing napier grass silage as roughage source at 30% of DM. Gas production was measured at 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 18, 21 24, 30, 36, 42, 48, 60 and 72 h after incubation. The results showed there were no significantly different ($P>0.05$) among experimental groups in the intercept (a) which ideally reflects the fermentation of the soluble fraction, gas production from insoluble fraction (b). However, rate of gas production (c) was higher (0.058%/h; $P<0.01$) for diet that contain of glycerin at 4% compared to other diets. Moreover, at 4 h of fermentation TMR diet with 4% of glycerin had higher in volume of gas production (10.6 ml) compared to control and diets with 8 and 12 % of glycerin ($P<0.05$). No differences among treatments were measured for cumulative of gas volume at 8, 12, 24, 48 and 72h of fermentation with increasing glycerin level ($P>0.05$). Increasing glycerin level did not affect cumulative of gas production *in vitro*. However, this by-product of biodiesel production from palm oil may be tested *in vivo* as an alternative energy feedstuff in dairy diets.

Keywords: crude glycerin, gas production

F-01 Empirical Evaluation of Crystalline Silicon and Amorphous Silicon Thin-film Photovoltaic Module Output Power and Efficiency Using Current-voltage Characteristics

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The behavior of solar photovoltaic (PV) modules has been the subject of many previous studies, with evaluation coming from both a simulation perspective and a field-based perspective. This study evaluated the response of 100-Watt monocrystalline silicon, polycrystalline silicon, and thin film amorphous silicon (a-Si) solar PV modules with respect to four simultaneous varying environmental parameters, namely: irradiance, ambient temperature, front panel temperature, and back panel temperature.

For each module type, the current-voltage (I-V) characteristics were determined and fitted to a two-term exponential model, then used to calculate each module's maximum power and efficiency. The data sets were subjected to statistical analysis, specifically: (1) determination of Pearson's correlation coefficient and (2) multiple linear regression coupled with factor analysis.

The results of this study include the influence of each environmental parameter for each PV module type, with findings showing that the front-panel temperature is most influential for crystalline modules, while back-panel temperature is most influential for the a-Si modules. Mathematical models were developed for maximum output power and efficiency as a function of four variables, in the form $f(G, T_F, T_B, T_A)$. Surface plotting of the derived models revealed a difference between minimum and maximum environmental conditions of up to 62 W and 0.08% for maximum power and efficiency for monocrystalline silicon modules, the corresponding values being 69.06W and 0.82% for polycrystalline modules, and 67.16 W and 0.002% for a-Si modules. Finally, an introductory analysis on the effective cost per watt is presented, taking into account each module's cost and possible prices of agricultural land.

Keywords: solar photovoltaic, power output, modeling

F-02 Development of Portable Artificial Rainfall Simulator for Evaluating Sustainable Farming Practices in Kenya

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Soil Erosion has been a consistence problem for many years, hampering agriculture especially for the developing countries. This has caused general shortage of food production resulting to instability of food security. *Mwakirunge* area within *Mombasa*

County in Kenya, farming has faced serious challenges which include unreliable rainfall, water shortage, poor methods of land utilization, lack of better and modern agricultural technologies but the most dominant challenge is the lack of proper sustainable methods of soil and water conservation. This has led to destructive soil erosion, water mismanagement and water loss. Soil degradation, nutrients loss, soil infertility, water logging and poor water drainage are some of the challenges related to soil erosion. Accordingly, if no proper solutions are applied to intercept these occurrences, the damage can be rampant and irreversible.
However, Efforts have been done to reduce soil erosion including research both in the laboratory and in the field. Various research approaches have been applied for but more requires to be done on this subject. One of the practical researches that have been carried out for long time is the amount of soil loss due to various factors like Rainfall energy, slope factor, vegetation cover, soil erodibility factor and farming practices. Rainfall Simulator has been applied in several experiments to determine Rainfall factor through observation and calculation of various parameters like Intensity of artificial rainfall, drop size distribution, fall velocity and kinetic energy of raindrop.
This study is aimed at developing a portable artificial rainfall simulator which will be used to collect data from the simulated rainfall and formulate methods of Surface runoff and water infiltration research, with a target of analyzing soil erosion and control strategies, for sustainable farming practices in Kenya.

Keywords: Simulator, Rainfall, Soil,Erosion, Conservation

F-03 Current Agricultural Conditions and Constrains in Paktya Province of Afghanistan

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Agriculture is the backbone of economy of Paktya Province with more than 80% people engaged in agriculture for their livelihoods. Despite of such a large workforce involved in this venture, the outcomes are not very satisfying. A survey was conducted to find out the possible reasons for this low outcomes and to identify the measures to improve the condition.
Survey was done in accordance with a pre formed questionnaire. As per the survey it was found that majority of farmers use traditional farming methods and have very poor technical knowledge. The low productivity and fertility of soils as well as the lack of irrigation water were identified as major factors causing low agricultural production at the research area. In addition, 32.4% of responded farmers answered soil erosion happens very severe and 50.0% answered soil erosion happens severe. It means that more than 80% of farmers require the proper conservation strategies for holding soil fertility.
It was considered that soil degradation caused by erosion phenomena with high intensity rainfall causes low holding capacities of nutrients and water of soils. The development of proper conservation strategies as well as farmers education in proper soil management are indispensable to achieve sustainable agriculture in Paktya Province, Afghanistan.

Keywords: Afghanistan, Paktya, soil erosion, conservation, agriculture

F-04 Performance of Rice Husk Energy Box Dryer Using Strip Exchanger Type for Paddy Drying

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Rice husk has been researched as a biomass energy for grain drying. Several researches has been conducted related to the use of rice husk in different methods. Anyway, the dirt and smoke of the burning rice husk was still entered the drying box that decreased the rice quality. In this research rice husk was burned to heat water in the boiler. Hot water steam generated from the boiler was flowed into the strip heat exchanger. An axial blower was run to suck surrounding air that purposesively passed the strip metal to take the heat energy from it. The results showed that the temperature of fire was 740^0C, furnace wall temperature was 384^0C, boiler wall temperature was 200^0C, steam duct wall temperature 165^0C, heat exchanger tank temperature was 101^0C, strip temperature was $57,2^0$C, plenum temperature was $42\text{-}45^0$C, grain bed temperature was 33^0C, and chimney temperature 190^0C. Moisture content of 19,4 percent could be decreased to 13,9 percent for 17 hours.

Keywords: rice husk, box dryer, paddy

F-05 Possibility of Estimation of Actually Cultivated Area in Paddy Field Using Modis Images

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Kampili irrigation area (17,480 ha), in South Sulawesi, Indonesia was consolidated by the national "Bili-Bili Irrigation Project" (1997-2005) for increase of rice production. Enough irrigation water can be supplied from the Bili-Bili multi-purpose Dam for the whole area. But water distribution was never sufficient in dry season mainly because tertiary canals were not constructed by the Project.

A water users association was built up to address this problem, developing tertiary canals construction by farmers themselves. As well as evaluation of the effect, monitoring the transition of rice crop planted area after implementation of the Project is very significant.

In this study, the Kampili irrigation area was classified into 6 land use categories (paddy, upland, forest, bare, water area, and city) on a GeoEye-1 satellite image with ArcGIS and eCognition. The result was regarded as ground truth. Each land use area was aggregated for the same pixel boundaries as that of MODIS satellite data. Two multiple regression analyses were performed to estimate cropping area ratio R_{crop} and vegetation area ratio R_{veg}. Reflectances of 7 bands of MODIS and 5 indices (NDVI, EVI, NDWI, LSWI, and DVEL) were used as explanatory variables. As a result, estimation accuracy of R_{veg} was very high, meanwhile that of R_{crop} was lower than R_{veg}. Another method to estimate R_{corp} was conducted by calculating the difference of the highest and the lowest R_{veg} values in one crop season. The accuracy of R_{crop} was almost the same as the result of multiple regression analysis.

Keywords: MODIS, Remote sensing, Actually cultivated area, Bili-Bili, multiple regression analysis

F-06 The Production of Syrup Sugar From Jackfruit Using a Membrane Technology

CANCELLED

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Jackfruit among the Indonesian people known as fruits sweet sugar with fragrant taste. Though the content of sucrose and fructose in the jackfruit is quite high with low total fat content, making it suitable to be used as sugar with low fat content. Fructose is a sugar compound that is not directly digestible by the human body's digestive system, so it needs to be processed first into simpler sugars. Jackfruit production increased and making raw material use as sugar diet for patient Diabetes Melytus (DM).

Research on Jackfruit use as a source sugar diet has not yet result although many experts discuss or nutriotional food. To attention to do more research is in focus.

Researchers in generally do with jackfruit fermentation process to get the syrup sugar but has not really result because the sugar content is low. This research were performed using the process hydrolysis temperature heating equipment and length of time, the continuing jacfruit syrup to purified and separated using a membrane technology

Keywords: jackfruit, sucrose, fructose, membran technology, FLUX

G-01 The Expression of Mips in Three Genotypes of Sugarcane Under Salt Stress

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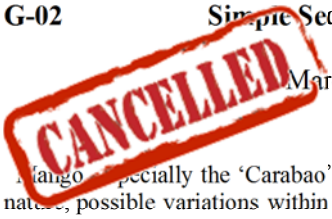
Some of suagrcane planting areas in Thailand are saline or potentially saline soils. Under saline soil, sugarcane has to adapt to be able to continue its growth by certain physiological responses inconsert wih the expression of some stress inducing genes. *Myo-inositol 1-phosphate synthase* (*MIPS*) gene associated with the bio-synthesis and accumulation of osmolyte, myo-inositol-1-phosphate is one of them. The *MIPS* from commercial, wild sugarcane and the interspecfic hybrid were cloned. It indicated that the full length of *MIPS* gene is 1,533 bp and encodes for protein of 511 amino acid residues. The 1.5 months old seedlings of those three sugarcane genotypes were subjected to 1/10 Hoagland's solution supplemented with 100 and 200 mM NaCl for 5 days. The exprssion level of the gene was determined by real-time PCR. It was found that at low level of salt stress (100 mM NaCl) the expression of the gene in root was higher than that in leaves. The highest expression levels were within 1-3 days after receiving salinity except in the interspecific hybrid sugarcane that the expression of the gene increased with the increasing time of stress. In contrast, at higher salt stress (200 mM NaCl) the expression of the gene in leaves was higher than that in root and the highest expression levels were found at 2 days after receiving salt stress. This gene may be

developed into gene targeted marker for selection of salt tolerance in sugarcane.

Keywords: sugarcane, salt stress, gene expression, osmolyte

G-02 **Simple Sequence Repeat (SSR) Marker Based Variety Identification in Philippine Mango (Mangifera indica L.)**



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Mango, especially the 'Carabao' variety, is polyembryonic in nature, that produces zygotic and nucellar embryos. Due to this nature, possible variations within varieties can be attributed to mutation, selection, and genetic drift. Simple-sequence repeat (SSR) markers were used in order to construct the DNA profiles of 14 Philippine mango varieties that possesses the general characteristcs of the 'Carabao' and registered and recommended by the National Seed Industry Council (NSIC) for planting by farmer. A Total of 46 SSR markers were used to characterize and identify these mango varieties. The similarity coefficient generated using molecular data ranged from 0.51 to 0.92. Unweighted pair-group mean average (UPGMA) cluster analysis generated three clusters, wherein the varieties within the clusters were closely related to each other. Variations in the banding patterns using different SSR markers were used as basis for identifying variety specific loci and alleles. Varieties from the collection can be identified using a minimum of 14 markers (21 alleles). Identified variety specific markers can be used for variety identification and authentication. This study was aimed at developing an identifcation key for varieties of Mango in the Philippines for planting material certification.

Keywords: Mango, SSR Markers, DNA profiles, 'Carabao'

G-03 **Identifying Variety Specific Loci in Philippine Citrus Collection Using Simple Sequence Repeat (SSR) Markers**

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DNA profiles of 44 citrus varieties from nine species were constructed using 44 polymorphic simple-sequence repeat (SSR) markers to characterize and efficiently identify citrus species and varieties in the Philippines. The SSR-derived similarity coefficients of the collection ranged from 0.43 to 0.77, deemed sufficient to delineate the varieties. SSR polymorphism information content (PIC) values were moderate to high, ranging from 0.31 to 0.98, proving that SSR is a robust marker for variety identification. Observed variation between banding patterns using different SSR markers served as the basis for identifying variety specific loci and alleles. The use of identifying these is to distinguish different varieties with least possible number of markers. Minimum of 15 markers (21 alleles) may be used to identify different citrus varieties in the collection. Variety-specific markers were identified to systematize and hasten variety identification and authentication. This is the first study using molecular markers to develop an identification key for citrus in the Philippines for faster breeding for commercial purposes.

Keywords: DNA profiles, Citrus, polymorphism, SSR markers

G-04 **Preliminary Survey on Usage of Capsicum Spp. on The Yap Islands, Yap State, The Federated States of Micronesia**

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Usage of *Capsicum* spp. on the Yap Islands, Yap State, the Federated States of Micronesia was studied to identify the relationship between people and *Capsicum*. Three species of *Capsicum* were cultivated in the Yap Islands: *C. annuum*, *C. frutescens*, and *C. chinense*. Many cultivars of *C. annuum* and *C. chinense* are thought to have been introduced to the Yap Islands recently. In contrast to *C. annuum* and *C. chinense*, people called *C. frutescens*, especially the small and green immature fruit color type, "Yapese," "native," or "local." People who preferred spicy flavors ate fresh fruits raw together with local foods such as taro and fish. Some added fresh fruits to soups and fried food, some used them to make a dipping sauce, and some soaked them in vinegar (usually made from coconut) or soy sauce. People in the Yap Islands did not use dried fruits. The leaves of *Capsicum*, especially *C. frutescens*, were used for soups or fried vegetables as a leaf vegetable. Compared to the main islands of the other states (Weno Island in Chuuk State, Pohnpei Island in Pohnpei State, and Kosrae Island in Kosrae State), the frequency of using the leaves seemed to be higher. All the interviewees had ever seen weed forms of *C. frutescens*, which were found along the roadside or around houses and gardens. They had seen a common domestic fowl and/or a black bird called *gap'low* eating fruits of *C. frutescens*. *Capsicum* fruits were used for headaches or to treat sick domestic fowl.

Keywords: Ethnobotany, Capsicum, Micronesia, Area Study, Medicinal use

G-05 New-generation of Agriculture Teacher Training Model for Sustainable Development of Vocational Agriculture Education in Thailand

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This research aimed to determine the teacher training model to produce the new-generation of agriculture teachers for agriculture and technology colleges. The study was carried out by exploring the experiences of vocational agriculture teacher development of 10 luminaries from 5 institutes producing agriculture teachers, as well as 28 administrators and 26 teachers purposively selected from 48 Colleges of Agriculture and Technology. Data were collected by interview using semi-structured interview schedule and analyzed by content analysis. This teacher training model was synthesized and confirmed using a focus group discussion attended by 33 stakeholders including administrators, professors, luminaries and the researcher. The quantitative data were supported by questionnaires completed by 234 certified teachers from 48 Colleges of Agriculture and Technology. Frequency and percentage were used for data analysis.

According to the National Education Act of Thailand, all professional teachers should licensed by the National Council of Teachers and are designated as lower undergraduate teachers. Therefore, the Institutes producing agriculture teachers and Colleges of Agriculture and Technology collaborated to develop the appropriate model for the new-generation of agricultural teacher. The teacher training model was synthesized into four models to produce the new-generation of agriculture teacher. Opinions the four models varied among the certified teachers. The first model, progressed from Agriculture Professional Certificate to B.Sc. (Agriculture) and then is topped up with the Teacher Professional Certificate (39.70%). The second model, progressed from Agriculture Professional Certificate to B.Ed. (Agricultural Education) following a five year program (38.00%). The third model, progressed from high school to B.Sc. (Agriculture) and then is topped up with the Teacher Professional Certificate (14.10%). The fourth model, progressed from high school to B.Ed. (Agricultural Education) following a five years program (8.10%). In addition, the focus group discussion forum illustrated the strengths and weaknesses of the four models. The first and second models showed the strength of agricultural skills and the weakness of agricultural science. Conversely, the third and fourth models indicated the strength of agricultural science and weakness of agricultural skill.

Keywords: agriculture teacher, vocational agriculture

G-06 Transform of Agricultural Education System for Sustainable Development

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The scope of “Agriculture” has been recently broadened from the conventional livestock and plant cultivation to the fundamental of life which includes food, woods, fibers, fuels, medicines, environment, and aesthetics. Moreover, agriculture is no longer considered as sciences or applied sciences but the combination between sciences and arts. As a consequence of these changes, agricultural education system needs to be rapidly transformed in order to provide this new perspective to the students. The Dynamic of direct factors in Livestock and Plant Production as well as the Concept of “Real Time Agriculture”, The Concepts of Sustainability and Environmental Friendly, Food Issues (security, safety, and assessment), and Supply Chain Management are the key topics that should be comprised into our current agricultural education.

In order to strengthen the students’ understanding about this new perspective of agriculture, both faculty members and students need to work more in the field rather than working in the classroom, library, and laboratory like these days. In this case, "Practical Science", the school motto of Tokyo University of Agriculture advocated more than 100 years ago by the first President YOKOI, seems to perfectly suit this idea. The initial fundamental principle of “Practical Science” lies in the rational spirit in which problems are completely grasped and analyzed considering diversified conditions and eventually solved through pursuing theories and means. "Practical Science" is also multi-disciplinary science and the fundamental principle is "Return man to the farm".

Keywords: agricultural education, sustainable development, real time agriculture, practical science, transform

H-01 **Medical Application of *Mucuna pruriens* Seed Cultivate in Thailand**

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Mucuna pruriens Linn.(MP) belongs to family leguminous plant for improving fertility. MP widely known as "velvet bean" or "cow-age" is a vigorous annual climbing legume originally from India, Nigeria and South East Asia. This plant has potential for medical plant used by Indian folk medicine for analgesic, antipyretic, anti-inflammatory agent, anti-diabetic, antivenom activity, aphrodisiac activity, antiglycaemic effect and Parkinson's disease. This plan is contains rich proteins, carbohydrates, calorific value, fiber and vitamins. Beside their high nutrition value were found in seed MP, mainly for the presence of 3,4-dihy-droxy-L-phenylalanine (L-DOPA). This bioactive chemical is precursor to several neurotransmitters, including adrenaline, noradrenaline and dopamine for treatment of Parkinson's disease. It improved health-prevent functionality and anti-Parkinsonian. This plant is rich in alkaloids such as prurienine, prurieninine, prurienidine, triterpines and sterols (β-sitosterol, ursolic acid, etc.) were found in seed of MP. The result shown that to be rich in starch, crude protein (25–30%), amino acid, fatty acid, phenolics, tannins and minerals (Cu, Zn, Mg, Na, Ca, Fe, K and P). The chemical analysis of MP seed was found L-DOPA content 5-6%. The greatest impediment to promotion of MP seed serves as food, feed or pharmaceuticals. Hence, this present has been focused on the medicine property of MP are summarized, taking in consideration the studies that have used the seeds powder or seed extract.

Keywords: Mucuna prurient, velvet bean, 3,4-dihy-droxy-L-phenylalanine, L-DOPA

H-02 **Dietary Risk Assessment of Insecticide Residues in Fresh Salad Vegetables**

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Monitoring of insecticide residues in fresh salad vegetables was conducted using market basket sampling from 2014 to 2015. Fresh vegetables included lettuce, carrots, tomato, cucumber, celery as well as various sprouts. Commercial salad mixes were also sampled from fast food chains and supermarkets in the Metro Manila area and Laguna, Philippines. Home food processing of vegetables, such as washing with water, mild detergent, boiling and grilling were also assessed to determine reduction of residues. Insecticide residues were analyzed by gas chromatography using flame thermionic detector for organophosphate insecticides. In general, the vegetable samples did not contain detectable insecticide residues. A few such as celery and bell pepper contained low levels of chlorpyrifos, profenofos and malathion residues. Grilling and washing with mild detergent resulted in reduction of residues.

Keywords: vegetables, food, safety, insecticide, residues

H-03 **Molecular and Biochemical Characterization for The Enzymatic Expression of Osglp8-2 in Developing Rice Grain**

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Germin-like proteins in cereals are known to function in pathogen resistance, but little is reported on their involvement in grain development. A multifunctional germin-like protein in rice (OsGLP8-2) that is up regulated in rice endosperm was characterized for its enzymatic activities in a large set of genotypes and in the developmental stages of IR64 and Nipponbare cultivars. *In*-gel assay for oxalate oxidase (OxO) activity of OsGLP8-2 revealed that most rice cultivars belonging to genotype temperate japonica lacked OxO activity. However, when the coding sequence of varieties that lacked OxO activity were analysed, nucleotide polymorphism was only observed in two varieties suggesting that mutation may not be the primary reason for the lack of OxO activity. Moreover, spectrophotometric and *in*-gel superoxide dismutase (SOD) assays for the oligomeric OsGLP8-2 exhibited highest activity at 12DAF (12.5 U/ml and 25.8 U/ml of SOD for Nipponbare and IR64 respectively, to obtain 50% inhibition of cyt c reduction) but further reduced as the grain matured. As the SOD activity declined, the OxO activity started to increase (12DAF-28DAF). Nipponbare only showed SOD activity and no OxO activity; however IR64 showed both the activities. The presence of nucleotide pyrophosphatase (NGPPase) activity of OsGLP8-2 in decamer conformation that was highly expressed at 8-12 DAF of both cultivars suggested a role in starch metabolism. A time course analysis of OsGLP8-2 transcripts showed high expression of the gene at the early stage of rice endosperm (5-12 DAF) and started to decrease as the grain matured.

Keywords: RICE, GERMIN-LIKE PROTEIN, SUPEROXIDE DISMUTASE, OXALATE OXIDASE, NUCLEOTIDE SUGAR

PYROPHOSPHATASE

H-04 Phenolic Compounds and Antioxidant of Commercial Phalaenopsis

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Phalaenopsis orchids known to all as kind of commercial flowers which are commonly called the moth orchid belonging to the family Orchidaceae. The present study was conducted to determination of total phenolic compounds, flavonoid content, and antioxidant activity of ethanol extracts of *Phalaenopsis* hybrids. Total phenolic content of extract was estimated by Folin-Ciocalteau reagent assay in methanol extract. Content of total phenolics was highly found to be 8.55 ± 0.02 mg GAE/g DW. Antioxidant activity of root and leaf extracts was evaluated by DPPH free radical scavenging assay, reducing power method and ß-carotene bleaching method. The antioxidant activity of root extracts was higher those of leaf. An increase in absorbance at 700nm revealed reducing power of the extract. There are eleven phenolic compounds were identified include protocatechuic acid, *p*-hydroxyl benzoic, vanillic acid, caffeic acid, syringic acid, vanillin, ferulic acid, sinapic acid, *p*-coumaric acid, benzoic acid and ellagic acid. Ferulic acid, *p*-coumaric acid and sinapic acid are concentrated largely in the root samples. The result suggests that the root extracts from *Phalaenopsis* hybrids could use as a source of antioxidants.

Keywords: Phalaenopsis, phenolic compounds, antioxidant activity, orchid

H-05 Antioxidant Activity and Phenolic Compounds of Castanopsis Phuthoensis Luong and Castanopsis Grandicicatricata N. H. Xia & D. H. Vuong Growing in Vietnam

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The antioxidant activity, phenolic and flavonoid contents of bark and leaf extractsof two species *Castanopsis phuthoensis* and *Castanopsis grandicicatricata* were evaluated in this work. The total phenolic content varied from 11.2 to 35.5 mg GAE/ g DW, total flavonoid content of those ranged from 2.2 to 12.6 mg RE/ g DW. This study showed that mostly barks and leaves of two species contain free phenolics were around 90% of total phenolics. The free flavonoids were up to 80% in leaves, 40% in bark of total flavonoid contents of studied samples. Regarding the antioxidant activity, it can be concluded that the radical scavenging activity of free phenolic content extracted from both bark and leaf of two specieswere comparative better than that of bound phenolic content. This is the direct relationship between total phenolic content and antioxidant activity. By HPLC analysis, there are 7 compounds consisting of gallic acid, *p*-hydroxybenzoic acid, vanillic acid, vanillin, sinapic acid, *p*-coumaric acid and ellagic acid were identified. Ellagic acid was the predominant compound identified in studied samples followed by sinapic acid and gallic acid. These rerults indicate that *C. phuthoensis* and *C. grandicicatricata*could be suitable for development of natural bioactive compounds and this is the first time reported the antioxidant property and phenolic compositions of *C. grandicicatricata*and *C. phuthoensis*growing in Vietnam.

Keywords: Castanopsis phuthoensis, Castanopsis grandicicatricata, antioxidant activity, phenolic compounds

H-06 Physiological Study of Tomato (Solanum lycopersicum) to Keep Fruit Freshness Under High Temperature Condition

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As tomato fruit has perishable and tender habits (Nasrin et al., 2008), postharvest freshness is affected easily and the yield losses are severe in some case; mostly about 30-40% of yield are lost because of poor post-harvest handling in Afghanistan (Syed Tamjid ur Rahman and Mohamad Hossain, 2005).

There is only few research on post-harvest handling of tomato fruit under high temperature without that of Ogura et al (1974) who reported that the storage of green mature tomato at 33C could prolong the shelf life when stored at mentioned degree for 10-20 days.

In this experiments, we studied the effects of high temperature storage duration (0, 5, 10, 20, and 30 days) on ethylene production, fruit color, and firmness of grren mature tomato fruit (cv. Red Ore).

The results showed that the storage of tomato fruit at 33 C inhibited ethylene production and red clor pigmentation, keeping the fruit firmness. It can be considered that the high temperature storage (33 C) might contribute to Afghan farmers to provide another choice of cheep and convenient method for keeping postharvest freshness of green mature tomato fruit.

Keywords: Afghanistan, Brix, color, ethylene, firmness

H-07 Correlation among Phytoalexins and Resistance to Drought, Salinity, And Weeds in Rice

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By this study, a total of 30 rice cultivars belonging to hybrid, improved, sticky, traditional, upland sticky, and upland rice were used to investigate the correlation between two rice phytoalexins including momilactones A and B to the resistance to drought, salinity, and weeds. Despite contents of momilactones A and B (M_A and M_B, respectively) have been demonstrated to be proportional to weed suppression ability in some rice cultivars in several previous reports, but the correlation coefficient of weed inhibition to M_A and M_B were rather low (0.09 and 0.001, respectively). M_A showed strong correlation coefficient to drought tolerance (0.65) than that of M_B (0.11). In contrast, M_B revealed stronger correlation coefficient (0.27) than that of M_A (0.16) to salinity tolerance. The correlation coefficient of salinity tolerance to weed suppressing ability (0.48) was much greater than that of drought tolerance (0.003). Findings of this research suggest that M_A and M_B are more potential for enhancing tolerance to salinity and drought than weeds, especially M_A may be exploited as a reagent to strengthening the drought tolerance in rice.

Keywords: phytoalexins, momilactones, rice, drought, salinity

H-08 Allelochemicals in Germination of Rice and Weeds

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The alleopathy of rice and weed at the germination stage was evaluated in agar medium. The main objective was to identify the phenolic compounds released in rice and the environment during germination of rice and weeds. The results showed that the germination rate of lettuce significantly decreased when it was germinated together with either dehulled rice or hull. Rice, dehulled rice and hull strongly affected the survival rate of and growth radish, especially root length. The total phenolic and flavonoid contents in the agar media dramatically changed when weeds were germinated with rice. In the medium of dehulled rice and lettuce treatment, the phenolic content significantly increased while flavonoid content decreased, compared to total of the two controls. Gallic acid increased in leaf of dehulled rice germinated with lettuce and radish, which changed from 42.69 ug/g dry weight (control) to 63.35 and 44.76 ug/g dry weight, respectively. Catechol (22.28 ug/g dry weight) was solely produced when rice germinated with radish. High amount of benzoic acid was generated in leaves of rice germinated with lettuce and radish, which constitute 1405.39 and 585.62 ug/g dry weight, respectively. The findings demonstrate that germination of weeds is impacted by the presence of rice, dehulled rice and hull. Catechol and benzoic acid may have the role of an alleochemical in rice.

Keywords: alleochemical, rice, weed, germination, phenolic

H-09 Phenolic Compounds Involving in Salinity Tolerance of Rice

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This study was conducted to evaluate the morphological and physiological basic of salinity tolerance in rice varieties. Six rice varieties was grown in screening trays that obtain three salinity treatments (EC = 0 dS/m as control, EC = 5 dS/m and EC = 10 dS/m). Varieties OM4900 and BC15TB were identified two salinity tolerance varieties and variety X7*KD was a susceptible

varieties based on IRRI standard protocol. Salt stress caused substantial decrease in shoot lengths, fresh and dry weights for all rice varieties. Beside, root length of observed varieties increased over controls (0 dS/m) with salt stress (5 dS/m) except variety X7*KD. However, root length of two varieties OM4900 and BC15TB were only increased 30.27% and 40.50% while other root length of other varieties were decreased over controls at the higher salinity concentration (10 dS/m). Salinity also enhanced total phenolic and flavonoid content in tolerance varieties OM4900 and BC15TB except susceptible variety X7*KD. HPLC system determined the increasing of vanillin, procatechuic acid, ferrulic acid and p-coumaric acid in resistance variety BC15TB and the decreasing or disappear of the above phenolic compounds in susceptible variety X7*KD under salt stress. In conclusion, although salinity decrease the growth of all tested rice varieties, varieties BC15TB and OM4900 were more resistant to salt stress than other varieties, owing to higher buildup of total phenolic and flavonoid content, especially some phenolic compounds, which may helped to tolerate salt stress.

Keywords: Salinity, Rice, Phenolic compounds, HPLC

H-10 Involvement of Secondary Metabolites in Response to Drought Stress of Rice (*Oryza sativa* L.)

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Water stress in a climate change scenario is one of the major threats for sustainable rice productivity. A certain level of drought can cause considerable yield losses. Combining drought resistance with yield potential is the most promising challenge for rice breeders. Deeply understanding of rice self-defense mechanism through plant secondary metabolites activity will be useful and necessary to support improving the drought tolerance of rice. In this study, twenty rice varieties were screened in greenhouse to collect potential drought tolerant cultivars. The leaf samples of these rice varieties were then analyzed for the contents of total phenolics and flavonoids, antioxidant activity and identified phenolic compounds. As a result, Q8 was considered as a strongest drought tolerant variety with high contents of total phenolics (65.3 mg GAE/g extract) and total flavonoids (37.8 mg RE/g extract). Whereas, Q2 variety was appeared is susceptible to water stress with lower contents of total phenolics (33.9 mg GAE/g extract) and total flavonoids (27.4 mg RE/g extract). Furthermore, Q8 exhibited stronger DPPH (1,1-diphenyl-2-picrylhydrazyl) radical scavenging activity than Q2, and their IC_{50} values were 0.92 and 1.41 mg/ml, respectively. In addition, eight phenolic compounds were identified and quantified by HPLC in Q8 extract, while six compounds were found in Q2. However, the content of these phenolic compounds varied with the cultivar. These results indicated that plant secondary metabolites particularly phenolic compounds might play a major role in response of rice variety to water deficit stress.

Keywords: Phenolic compounds, Secondary metabolites, Rice, Drought stress, HPLC

H-11 Bioactivity of Root Exudates and Identification of Allelochemicals From Sweet Sorghum

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The effects of root exudates on germination and early growth of two sweet sorghum K1131(A cultivar) and K3425(B cultivar) were examined. The root exudates showed strong influence on growth and germination of lettuce in bioassays. Total phenols of the root exudates were 22.93 ±0.91 mg gallic acid equivalent (GAE)/g for A cultivar and 15.65 ± 0.65 mg GAE/g for B cultivar. Individual phenolic substances are identified by HPLC. On the other hand, the allelochemical components in the plant parts of the sweet sorghum are also analyzed to compare with those of the root exudates. It is suggested that the plant parts of sweet sorghum left after ethanol production can be exploited as a source for biological control of weeds

Keywords: Sweet sorghum, allelochemicals, phenolics, HPLC, weed suppression

H-12 Biological Control of Paddy Weeds by Rice Allelopathy

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In this study, fourteen rice varieties utilized in my experiment. The main purposes of this experiment are: 1), to select the strongest allelopathy and weakest varieties, by analysing quantity and dry weight of weeds. 2). Identification of allelochemicals involved in weed suppressing ability of rice, identify growth inhibitors from leave of rice by (HPLC), from compare the allelochemicals to know that what kind of chemical containing strong allelopathy ability.

Keywords: Alleochemical, Rice, Weed, HPLC, Phenolic

I-01 Agricultural Resources and Farmers' Practices for Sustainable Agroecological Management in West Java, Indonesia

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Minimizing external inputs and utilizing local resources are fundamental principles for long-term sustainable agricultural systems. To reorganize sustainable local farming systems in the interests of agricultural diversity, we aimed to determine existing agricultural plant resources utilized for farming and to investigate local farmers' practices in two areas of Petir Village, Bogor Regency, West Java, Indonesia, for two years.

Different plant species were recorded according to whether they were in the fields or in the levees of the fields. Plant crops produced in the fields were mainly commercial field crops for sale, whereas plants grown in the levees were more diverse in type and use, such as for the production of fruits, medicinal, aromatics, and timber. It was also clear that the purpose and function of each planting site were different; the levees had a function to support the livelihood of people through local agrodiversity.

In the fields, during both the rainy and dry seasons, the most dominant crop was sweet potato, and farmers utilized its above-ground plant foliage by sharing it with small-ruminant livestock raising households, as is the local custom. Furthermore, the connection between crop production and small-ruminant livestock husbandry seems to be an important part of material recycling in the local agroecosystem. Weeds grown in the fields, levees, and roadsides are also freely shared with livestock farmers. This practice is often observed in West Java, and it potentially plays a role in maintaining vegetation and local biodiversity in the area.

Keywords: agroecology, farmers' practices, integrated farming system, plant resources, weed management

I-02 Nitrogen Mineralization of Fishpond Sediment and Fishpond Water in Inceptisol of Petir Village, Darmaga, Bogor, Indonesia

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Nitrogen (N) mineralization of fishpond sediment and fishpond water in the soil was evaluated. 300 g (oven-dry weight) soil was weighed into a plastic pot and added with fishpond sediment or combination of fishpond sediment and fishpond water or goat manure. The pots were incubated for 2, 4, 6, 8 15 weeks. The rate of fishpond sediment was 30 ton $ha^{-1}$and the fishpond water was 20 L per week. As for goat manure, the rate was 10 ton ha^{-1}. Experimental design was completely randomized design with three replicates. After the periode of incubation, ammonium and nitrate were analyzed. The results showed that the in the week 2 and week 4, N mineralization of fishpond sediment and combination of fishpond sediment and fishpond water mostly were in the form of ammonium. In the week 6 and 10, the amount of nitrate was increasing significantly. In the last incubation periode, mostly ammonium changed into nitrate and the amount of ammonium in all treatments were not statistically different. On the contrary the amount of nitrate were different where in the treatment of fishpond sediment was the highest among the treatments. The results suggested that fishpond sediment and fishpond water can be used as an alternative source of nitrogent fertilizer in Petir village, Darmaga, Bogor where integrated system of agriculture and inland fisheries was implemented.

Keywords: ammonium, fertilizer, integrated, nitrate

I-03 Feeding Biomass of Sweet Potato (*Ipomoea batatas* L) As A Substitution for Concentrate on The Performance of Thin Tailed Sheep

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Concentrate feed is highly nutritious feed for better sheep performance. However, its price is too expensive for subsistence sheep farmer such as those in Petir village. This experiment aimed to measure the performance of Javanesse thin tailed sheep fed sweet potato biomass as an alternative of concentrate feed. The experimental design of this experiment was randomized block design (4x3) using 12 sheep of 9-12 mo with average body weight of 14.34 ± 1.32 kg. They were placed in metabolic cage. The treatments were P0 (100% of napier grass), P1 (70% napier grass + 30% concentrate), P2 (50% napier grass + 50% sweet potato leaves), and P3 (70% sweet potato leaves + 30% sweet potato tubers). The result showed that dry matter and organic matter intakes were significantly ($P<0.05$) affected by the treatment. Animal in P3 group had the lowest feed intake. Digestibility was significantly ($P<0.05$) affected by the treatment. The highest feed digestibility was in P3 group. Animal in P1 group had daily gain and feed effieciency similar with that of P3 group. Feeding sheep with 100% napier grass (P0) do not fulfill their nutrient requirement for proper growth. Biomass of sweet potato as a local feed resource can be used to replace concentrate feed for sheep.

Keywords: concentrate feed, performance, sheep, sweet potato

I-04 Improving Smallholder Farmers' Livelihood through Small-ruminant Husbandry in West Java, Indonesia

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In the Indonesian Muslim society, small ruminants are typically associated with small-scale farm household because they are easy to manage, productive, and have a ready market during religious festivals. Goat and sheep production could be a practical solution for a sustainable development of the rural community in West Java.

The aim of this study is to clarify the role of small-ruminant husbandry in improving the smallholder farmers' household livelihood through the effective utilization of their resources in the local agroecosystems. The study was conducted in Petir Village, Bogor Regency, West Java, where crop production, inland fisheries, and small-ruminant husbandry are widely practiced by farmers.

Sheep are more commonly raised than goats in the village; 88% of the households practice fattening (meat production), whereas 12% practice breeding alone or both breeding and meat. These animals are only fed green forage of weeds and crop residues grown in the agroecosystems. One of the local village manner is that anybody can cut weeds from anywhere free of charge. All respondents reported that they maintain small ruminants as "savings" gained through family labor. However, from an economic viewpoint, the average contribution to the total household income is 28% for small-ruminant husbandry, whereas it is 39% and 33% for main and side jobs, respectively. Small-ruminant husbandry plays a great role in the livelihood of small household farmers. This is because it does not require investment and external input, whereas the availability of plant biomass throughout the year offers added advantages.

Keywords: agroecosystem, household livelihood, income ratio, local village manner, small ruminant production

I-05 Problem of Limited Capital and Its Impact on Sheep Farmers' Incomes in Petir Village, Bogor Regency, Indonesia

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Working capital availability is one of the important factors to the farmers in expanding their sheep-raising activities. Petir village in sub-district of Darmaga is one of the centers of sheep raising activities to meet the high demand of sheep, particularly for *Eid al-Adha* Festival (Feast of the Sacrifice). Majority of the farmers raise the sheep (and goat) as their side jobs. However, most of them face the problem of lack of funds to purchase the baby sheep (lamb). Since farmers have difficulty in accessing commercial banking and formal microfinancial institutions, most of them borrow the required funds from money lenders (middlemen), who are also sheep raisers and traders. This condition affects the income of farmers, since middlemen charge high interest rate and force the farmers to sell their sheep to them. The objectives of this study are to identify the source of funds for sheep raising activities, to estimate the cost of fund, to identify determinant factors that affect farmers in borrowing money, and to estimate and compare the incomes of farmers who borrow money from the middleman and and those

who don't. The findings of this study indicate that there are two sources of funds to the farmers to buy the lambs: borrow from middleman and their own funds. The costs of fund depended on their amount of loans. The highest cost of fund was to those with the lowest category of loan i.e., less than Rp 2.000.000, with an average of 84, 77 percent per year or equivalent to 7,06 percent per month. Factors determining the amount of farmers' loans are as follows: farm expenses, total number of sheep, and the amount of their own funds. Comparison of incomes between the borrower and non-borrower of funds indicate that income of the latter was significantly higher that that of the earlier. This result suggests the importance of the availability and service of microfinancial institution to provide small funds to small farmers in rural areas.

Keywords: agricultural finance, cost of fund, demand for loan, role of middleman, farmer's income

I-06 Mortality Effect of Tephrosia Vogelii and Alpinia Galanga Extracts Againts Myzus Persicae

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One of factors causing decreasing of chili (*Capsicum annum*) production in Indonesia is *Myzus persicae* (Hemiptera: Aphididae) which causes loss of chili production up to 80%. In order to control this insect pest, botanical insecticide can be used as one of alternatives. One of the advantages in using the botanical insecticide is biodegradable, safer than synthetic pesticides and environmentally friendly. The objective of this study was to determine the mortality effect of two plant extracts, *Tephrosia vogelii* (Leguminosae) and *Alpinia galanga* (Zingiberaceae) as insecticides against *M. persicae* on chili using the residual on plant and systemic methods. Extracts of *T. vogelii* showed a higher toxicity using both the residual and systemic methods with LC_{50} values at 72 hours after treatment were 16 and 12 times more toxic than extracts of *A. galanga*. Comparing the application methods used, it seemed that systemic method was more effective than the residual method. Bioassay of *T. vogelii* extract using systemic method resulted in LC_{95} 8.5 times lower than using residual method on plant. The similar results had been shown in the bioassay of *A. galanga* extract which the systemic method showed more toxic than residual method.

Keywords: Botanical insecticide, Chili, Plant extracts, Myzus persicae

I-07 Effects of Rainy Season Pruning on Flowering of Calamondin (x Citrofortunella microcarpa)

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Calamondin is one of the most popular citrus which is consumed various ways in the Philippines. The price of calamondin drops during the peak season in August-October, thus farmers cannot earn enough income during that time. When the price is low, the farmers do not harvest the fruits, and many fruits were left on the tree or they sell them at a very low price. Off-season production is needed so that farmers can sell the fruits at a higher price.

Rainy season pruning of shoot to increase off-season fruit production was done on calamondin grown in San Antonio, Quezon and in Palayan city, Nueva Ecija, Philippines in August. Pruning consisted of heading back of current shoots to about 10 cm length and removal of flowers and very young fruits that have already developed at the time of pruning. One month after pruning, the number of flowers was counted to estimate the yield. In both areas, pruned trees produce more flowers than the control. Pruning also delayed flowering. Since fruits are ready for harvest four months after flowering, the harvest season of the pruned trees will be during the period when price is high(December).

The effect of the pruning on fruit quality and yield are also discussed.

Keywords: Calamondin, fruit quality and yield, off-season production, rainy season pruning

I-08 Antioxidant Capacity of Calamondin (x Citrofortunella microcarpa) Fruits and Commercial Beverage Products in The Philippines

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Calamondin is one of the most commercially important fruit crops in Philippines. Since it has a unique aroma and taste, the juice has a potential of being exported to Japan. The quality of calamondin fruits (x *Citrofortunella microcarpa*) was compared with some acid citrus fruits produced in Japan. Calamondin fruits were obtained from Palayan City, Nueva Ecija, Philippines and Okitsu Citrus Research Station, NARO (Sizuoka, Japan). They were harvested at four stages of maturity (mature-green, breaker, ripe and overripe). Calamondin juice and concentrate were also obtained from the Philippines to evaluate the quality of the processed products. The physico-chemical characteristics including ascorbic acid (AA) content and hydrophilic-oxygen radical absorbance capacity (H-ORAC) value were examined.

Similar characteristics were observed among calamondin and other acid citrus species except for shiikuwasha (*Citrus depressa Hayata*). Shiikuwasha had lower AA content and higher H-ORAC value than calamondin and other acid citrus fruits produced in Japan. AA content and H-ORAC value in beverages of calamandin and shiikuwasha are also discussed.

I-09 Effects of Benzyladenine and Light on Calamondin (x Citrofortunella microcarpa) Postharvest Fruit Color and Quality

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Calamondin is one of the most important fruit crops in the Philippines. The fresh green mature fruits of calamondin have high market value and are prized for the green color of the peel. Benzyladenine (BA), a phytohormone, inhibits chlorophyll decomposition and maintains the green color of leaves. On the other hand, light decomposes the chlorophyll in leaves. In this study the effects of BA and light on fruit color and quality were investigated using harvested green calamondin fruits.

Calamansi fruits were obtained from the Okitsu Citrus Research Station, NARO, Japan. Fruits were sprayed with a solution of BA (0, 1, 10,100 ppm) and stored at 25℃ under light (fluorescent light, 16h photoperiod) or dark conditions. Fruit color was determined by a* value, and titratable acidity (TA), organic acid, ascorbic acid and sugar contents in the juice were analyzed at 5- and 9-day storage. Results showed the green color of fruit peel was maintained with BA treatments and under dark conditions. The effect of BA on green peel color maintenance was clear at higher concentrations. TA and organic acid content were not affect by BA and light. The ascorbic acid content decreased with BA treatments and under dark conditions at 9-day storage, while the sugar content increased under light. In conclusion, the BA treatment and dark conditions could be effectively applied for maintaining the green color of postharvest calamondin fruits.

Keywords: calamondin, benzyladenine, light, fruit color, fruit quality

P-01 Molecular Analysis of Pentatricopeptide Repeat Protein Gene From Mulberry (*Morus alba* L.)

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Pentatricopeptide repeat (PPR) proteins belong to a plant-specific family of nucleotide-binding proteins characterized by a tandem array of 2 – 27 repeats, with each signature motif or repeat consisting of about 35 amino acids. Because of the involvement of these proteins in RNA processing, protein-protein interactions, embryogenesis, fertility restoration, and organ development, gene sequences of these proteins were obtained from mulberry leaf genomic DNA through PCR-based methods. The four 602-bp clones had 65 – 88% nucleotide identity with PPR genes from other plant sources, while the predicted 199-amino acid protein had 37 – 76% protein identity with PPR proteins from other plant sources. All four clones have unique restriction digestion sites, with PPR4 having the most number of predicted restriction sites or SNPs. Superfamily and conserved domain search indicated that the predicted proteins belong to the PPR2 superfamily and contain the PPR protein consensus sequence. Three PPRs are present among the four predicted proteins, with the repeats located at amino acid residues 5 – 20, 29 – 53, and 62 – 88. Predicted subcellular localization of the four proteins was in the mitochondrion, while predicted biological process ontology mainly involves RNA modification, nucleic acid metabolic process, and cellular protein complex assembly. Predicted molecular function ontology primarily involves poly(G) RNA binding, and predicted nucleotide-binding regions are present on the predicted proteins. Results are consistent with current information on PPR proteins from other plants and provide more information on one of the least understood and largest protein families in plants.

Keywords: pentatricopeptide repeat proteins, mulberry

P-02 Effect of Substitution of Fermented Kapok Seed (*Ceiba petandra*) to Soybean Meal on Production and Egg Quality From Native Laying Hens

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This study aims to determine the level of use of fermented kapok seed to substitute 100% soybean meal in native laying hen rations without adverse effect on laying hen production. The study consisted of a series of field experiments to study the biological effects, production and on quality of eggs. The variables measured were feed intake, feed conversion, and income over feed cost (gross profit) as well as variables related to egg production (Hen day production and egg weight) and thickness of eggshell and yolk color index for quality of eggs. Two hundred and forty laying hen aged 20 weeks were used in this experiment. The completely randomized design was assigned with six treatments to replace 0, 20, 40, 60, 80 and 100% of soybean meal with fermented kapok seed with four replications. Data were analyzed statistically using ANOVA, and if the result shows a marked influence, it will followed by Duncan's Test (DMRT). The results showed that the performance of laying hen had not affected significantly by substituting soybean meal fermented kapok seed. Feed intake, feed conversion and egg production is not influenced either. In summary, the use of fermented kapok seed to substitute soybean meal in the ration can be up to 100% in the diet of laying chicken

Keywords: Fermented, kapok seed (Ceiba petandra), substitution, hen day production, native laying hen

P-03 Genetic Diversity of The Banana Bunchy Top Virus (bbtv) in The Philippines

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The Bunchy Top Disease (BTD) is the most devastating viral disease in *Musa* species. It is caused by either of two viruses of Genus *Babuvirus*, Family *Nanoviridae*: the Banana bunchy top virus (BBTV) and the Abaca bunchy top virus (ABTV). The previous belief that BTD is caused by a single virus, as well as the lack of information on the distribution of the two viruses, hinder disease management strategies. In this study, the occurrence and genetic diversity of BBTV isolates in the Philippines was determined. Total DNA was extracted from abaca, banana, and alternative hosts of BBTV (*Colacasia, Heliconia,* and Birds of Paradise) collected from Bicol and Mindanao regions. The viral coat protein (CP), movement protein (MP), and replication initiation protein (Rep) genes were detected by PCR amplification using BBTV-specific primers. Sequences of the three genes were analyzed and a Maximum Likelihood phylogenetic tree was generated using MEGA6 software. PCR results showed that BBTV infected banana and abaca in Albay, Catanduanes, Compostela Valley, South Cotabato, Saranggani, Davao del Norte, and Davao del Sur provinces. Sequence similarity matrices showed that the BBTV isolates have 99.7-100.0% nucleotide sequence identity in CP, 99.0-100.0% in MP, and 99.2-100.0% in Rep genes. Phylogenetic analysis revealed that these isolates cluster with the Asian group of BBTV. The low genetic diversity among Philippine isolates suggest that BTD in different regions can be treated effectively using the same disease management strategies.

Keywords: banana, abaca, banana bunchy top virus, genetic diversity, phylogeny

P-04 Construction of A Plant Transformation Cassette Using A Red Fluorescent Protein (RFP) Gene

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Genetic engineering of agriculturally-relevant crops has resulted in varieties that contain modifications for a wide variety of traits. Some of these traits include herbicide tolerance, environmental resistance, delayed ripening, and virus resistance. Transformation of plants can be done by the use of particle bombardment or through facilitated transfer by the bacterium *Agrobacterium tumefaciens*. Monitoring entry of the vector, along with transient expression of vector-encoded gene cassettes, is done with the use of colorimetric methods, such as the expression of *β*-glucoronidase (GUS) or with the use of fluorescent proteins. Use of fluorescent proteins is more favourable over colorimetric methods due to having a detectable signal without using a provided substrate, as is the case for colorimetric reason. In this study, the DsRed2 red fluorescent gene, a modified RFP from mushroom coral (*Discosoma* sp.) was amplified and inserted into the pCR2.1-TOPO vector. A plant expression vector (pBI121) was cut by restriction enzyme digestion at the 5815 bp and 7715 bp position to remove the GUS gene, followed by ligation of a DsRed2-containing fragment from the pCR2.1-TOPO vector cut using the same restriction enzymes. Sequence analysis of the resulting pBI-DsRed2 vector revealed complete replacement of the GUS gene with the

DsRed2 gene under the control of the CaMV 35S promoter.

Keywords: fluorescent proteins, agricultural biotechnology, DsRed2

P-05 Development of A Bait Trap for Mango Pulp Weevil [sternochetus Frigidus (fabr.)(coleoptera: Curculionidae)] in The Philippines

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A bait trap was developed in laboratory cage bioassays in order to determine if acetic acid would be effective when used as an attractant in trapping mango pulp weevil (MPW). Acetic acid is a component of both frass of mated male MPW and mango floral volatiles that elicited an attraction of 73.3% and 66.7% of virgin female MPW, respectively, when tested in previous Y-tube bioassays.

A clear plastic bottle trap + vial + acetic acid solution at 1 panicle equivalent and a dark plastic bottle trap + vial + acetic acid solution at 1 panicle equivalent caught more female weevils (57%) than glue traps + vial with filter paper + acetic acid at different panicle equivalents and glue trap + cotton ball with acetic acid at different panicle equivalents.

Keywords: Sternochetus frigidus, acetic acid, frass, mango floral volatiles, mango pulp weevil

P-06 Salicylic Acid Induced Reduction of Single Cymbidium Mosaic Potexvirus (cymmv) and Mixed Cymbidium Mosaic Potexvirus and Odontoglossum Ringspot Tobamovirus (orsv) Infection in in-vitro Mokara Protocorm Cultures

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The effect of varying concentrations of salicylic acid on *in-vitro* derived *Mokara* protocorms infected with single infection of *Cymbidium mosaic potexvirus* (CymMV) and mixed infection *Cymbidium mosaic potexvirus* and *Odontoglossum ringspot tobamovirus* (ORSV) was studied. Four treatments of varying concentrations of salicylic acid (SA) (0, 8, 16 and 32 mg/L) in ½ MS (½ macroelements) basal medium supplemented with 1 mg/L Benzyladenine (BA) and 20% coconut water (CW) were used to evaluate the effect of salicylic acid on virus resistance of protocorms infected with single CymMV and mixed CymMV and ORSV. Protocorms infected with both types of viruses had significantly decreased weight at higher concentrations of SA (32 mg/L) as compared to the control but not with other SA concentrations. Likewise, virus infection was also reduced in the same SA concentration as shown in Indirect ELISA at 30 days after inoculation. A similar trend was also observed on the growth and virus infection on protocorms at 18 days after subculture to the same set of freshly prepared culture media. These results indicated that SA can reduce the population of the viruses in either single or mixed infection in 1.5 months of incubation. It is therefore possible that with longer period of incubation and with two or more subsequent subcultures of protocorms may further reduce, if not totally eliminate, viruses *in-vitro*.

Keywords: Salicylic acid, Cymbidium mosaic potexvirus, Odontoglossum ringspot tobamovirus, Mokara, Plant Tissue Culture

P-07 Molecular Characterization and Detection of Two Bunchy Top Viruses Infecting Abaca in The Philippines

CANCELLED

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The bunchy top disease in abaca is caused by two bunchy top viruses; banana bunchy top virus (BBTV) and abaca bunchy top virus (ABTV). To effectively manage these pathogens, it is necessary to characterize its genome and develop detection techniques. Three virus genes, the replication initiation protein (Rep), movement protein (MP), and coat protein (CP) genes were cloned and sequenced from leaf samples infected with the bunchy top disease. Total DNA from samples taken in different geographical regions in the Philippines was used as PCR templates to amplify the set of genes from each bunchy top virus. Nucleotide sequences for each gene were analyzed. PCR results showed that both ABTV and BBTV can exist in a single sample and mixed infections can occur in the field. The plasmid constructs bearing the CP gene from each virus were expressed in *Escherichia coli* as fusion proteins and the recombinant CPs were purified. The recombinant CPs were used to generate polyclonal antisera against BBTV and ABTV in rabbits and an indirect ELISA was developed. A multiplex PCR was also designed to target Rep, MP, and CP genes of each virus. Both ELISA and multiplex PCR readily detected BBTV and ABTV infection in abaca.

Keywords: molecular characterization, abaca bunchy top virus, banana bunchy top virus, virus detection

P-08 Salicylic Acid Induced Reduction of Single Cymbidium Mosaic Potexvirus (cymmv) and Mixed Cymbidium Mosaic Potexvirus and Odontoglossum Ringspot Tobamovirus (orsv) Infection in in-vitro Mokara Protocorm Cultures

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The effect of varying concentrations of salicylic acid on *in-vitro* derived *Mokara* protocorms infected with single infection of *Cymbidium mosaic potexvirus* (CymMV) and mixed infection *Cymbidium mosaic potexvirus* and *Odontoglossum ringspot tobamovirus* (ORSV) was studied. Four treatments of varying concentrations of salicylic acid (SA) (0, 8, 16 and 32 mg/L) in ½ MS (½ macroelements) basal medium supplemented with 1 mg/L Benzyladenine (BA) and 20% coconut water (CW) were used to evaluate the effect of salicylic acid on virus resistance of protocorms infected with single CymMV and mixed CymMV and ORSV. Protocorms infected with both types of viruses had significantly decreased weight at higher concentrations of SA (32 mg/L) as compared to the control but not with other SA concentrations. Likewise, virus infection was also reduced in the same SA concentration as shown in Indirect ELISA at 30 days after inoculation. A similar trend was also observed on the growth and virus infection on protocorms at 18 days after subculture to the same set of freshly prepared culture media. These results indicated that SA can reduce the population of the viruses in either single or mixed infection in 1.5 months of incubation. It is therefore possible that with longer period of incubation and with two or more subsequent subcultures of protocorms may further reduce, if not totally eliminate, viruses *in-vitro*.

Keywords: Salicylic Acid, Cymbidium mosaic potexvirus, Odontoglossum ringspot tobamovirus, Mokara, Plant Tissue Culture

P-09 Balbas Bakiro (*Momordica cochinchinensis*): An Underutilised "Super" Fruit in The Philippines

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Gac or spiny bitter gourd (*Momordica cochinchinensis*) is a dioecious perennial vine under the family Cucurbitaceae and is indigenous to Southeast Asia. It is considered as a "super" fruit due to its high level of lycopene, beta-carotene, lutein and Vitamin E content. In the Philippines, *M. cochinchinensis* is locally known as Buyok-buyok, Sugod-sugod and Balbas bakiro. Local communities situated in the mountainous areas of the Southern Tagalog Region (Region IV) use the fruit and young shoots as vegetable. Despite its nutritional content, this plant remains underutilised due to lack of awareness and limited information regarding its benefits and requirements for production and processing.
Currently plants collected from the wild are being propagated, studied for field production and analyzed for its nutritional content.

Keywords: Philippines, Indigenous fruit, Momordica cochinchinensis, Gac, Balbas bakiro

P-10 Edible Landscaping Starter Kit: A Promotional Material for Technology Adoption in The Philippines

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Edible Landscaping (EL) technology in the Philippines is being promoted nationwide to aid in increasing the availability of fresh and nutritious edible crops in house-hold level. Aside from conducting of seminars and training workshops and establishments of demo-gardens, a starter kit was created to facilitate technology adoption.
The EL Starter Kit serves as a complete guide to begin a simple EL project. The kit comprises of brochures, sample design, seed-mix package and contact details of possible sources of materials. The brochures introduce the concept and components of EL along with the summarized steps in making and maintaining an edible landscape garden, while the sample design includes details on edible crops and their arrangement in a specified space. The seed-mix package contains seeds of selected plants recommended in the design.
This promotional material is designed for the public to conveniently start their EL garden since all basic information and required seeds are available. This makes the kit a valuable instrument for the adoption of EL technology.

Keywords: Edible Landscaping, Promotion, Technology Adoption

P-11 Exploring The Potential Uses of Philippine Edible Canna (Canna indica)

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Canna (*Canna indica*) abundantly grows in the Philippines and is commonly used as an ornamental flowering herb that produces underground sympodial rhizomes. The rhizomes are edible but are not popular to the local community.
Wild species of Canna were collected from selected sites in the Southern Tagalog Region (Region IV) of the Philippines. The plants were propagated, cultivated in the field and harvested five months after planting. The rhizomes were processed into flour and were subjected to food composition analysis. Results showed that Philippine edible Canna flour is composed of 6.52±0.08% moisture, 8.48±0.08% ash, 1.06±0.35% crude fat, 8.07±0.04% crude fiber, 2.03±0.53% crude protein and 73.62% total carbohydrates/nitrogen free extract. Notably, the total starch content of the Philippine edible Canna flour (36.07%±21.39) was higher when compared to Australian Canna (*Canna edulis*) flour (34.00±1.99%).
The Philippine Canna flour is being evaluated as raw material for making cookies while other potential products from *C. indica* like starch are still being explored.

Keywords: Philippine edible canna flour, Canna indica, Utilization

P-12 Propagation of Selected Philippine Indigenous Plants With Potential Economic Uses

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The Philippines is a home to a wide range of indigenous plant species that could provide as an alternative food source for health and wellness and raw materials for other industries. However, these indigenous plants are underutilized due to limited knowledge and access. One of the vital step for their promotion is to study the appropriate propagation method to mass produce them for research and future utilization. Selected indigenous plants from the Southern Tagalog Region (Region IV) of the Philippines were mass produced through various sexual and asexual propagation methods. Some of the observations are: (A) scarified seeds of *Ardisia elliptica* had higher germination rate (95%) than with direct seeding (69%); (B) stem cuttings of *Abelmoschus manihot* responded well to 30% shading (51.4% rooting) than under full sun condition (31.4% rooting); (C) division of *Canna indica* rhizome with one to two nodes produced an average of 24 shoots for a period of five months; and (D) organ formation in leaf cuttings of *Begonia sp.* had higher success when grown in Lipa clay loam (LCL) soil alone (76%) than with a 1:1:1 (v/v) mixture of LCL, coir dust and burnt rice hull (8%).
Other propagation methods such as marcotting, grafting and nodal cutting of these selected plants are being explored.

Keywords: Philippines, Indigenous, Sexual reproduction, asexual propagation, propagation

P-13 Nationwide Information Dissemination of Edible Landscaping to attain Self-sufficiency in Household Level

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Edible Landscaping (EL) is extensively promoted in almost all regions of the Philippines due to its concept of providing food and attractive environment to every Filipino household.
The promotional strategies used in disseminating EL to attain self sufficiency in household level involves: (1) organizing trainings and seminars; (2) establishment of demo-gardens; (3) participation in exhibits; (4) paper presentation in different conventions; (5) trademark and technology registration; and (6) use of social media (Facebook and Instagram).
These strategies yielded positive response from the public which resulted to the adoption of the technology in several households, schools, government institutions and private organizations. Clamour of the public to gain more knowledge about EL led the media to feature the concept in radio and TV interviews and write articles in magazines, newspapers, broadsheets, and print ads. Project staffs were invited to different symposia and to do exhibits in festivals in and outside the country where

EL became the topic of interest.

Keywords: Edible Landscaping, Information dissemination

P-14 Empowering Potato Farmers to Produce Quality Planting Materials

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This study represents farmer led production of quality planting material thru several series of trainings which includes, phase 1 invitro planlet propagation, phase 2 stem cutting production thru rapid multiplication technique, phase 3 generation zero production, phase 4 virus indexing and phase 5 cost and return benefits of producing quality planting materials. Hands on training was conducted to thirteen group of associations in the northern Philippines. Trainors are experts of different disciplines includes tissue culture expert, pathologist, agronomist and economist. Initial planting materials of 55,000 thousand were given and were closely monitored and evaluated inorder to encourage them for a successful venture. Likewise discourage them to import seeds rather encourage them to produce quality products in preparation for the incoming ASEAN integration.

Keywords: generation zero, virus indexing, quality seed, import, venture

P-15 Prediction of Fat Content in Intact Cocoa Beans Using Near Infrared Reflectance Spectroscopy

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The majority of Indonesia's cocoa export is raw beans which accounted by 82% of the total export. Indonesian cocoa beans are only used as additional material by cocoa industrialized countries due to low quality. The objective of this research was to test and analyze the application of near infrared reflectance spectroscopy (NIRS) method together with partial least squares (PLS)to determine the quality of cocoa particularly to predict the fat content in intact cocoa beans which has never been conducted before. Besides, this research was also to study the application of 6 spectra correction methods i.e. mean centering (MC), multiplicative scatter correction (MSC), standard normal variate (SNV), mean normalization (MN), orthogonal signal correlation (OSC) and de-trending (DT) in increasing the performance of PLS. It is found in this study that PLS combined with MSC and SNV provide best prediction value with RMSEC were 0.93% and 0.91% respectively, whilst RMSEP and RPD, generated from both spectra pre-processing were similar i.e. 1.11% and 1.95 respectively.

Keywords: cocoa beans, fat content, NIR spectra correction, partial least squares (PLS)

P-16 Traditional Roots and Tubers Diversity and Knowledge Transfer Amoung Four Indigenous Peoples in Northern Philippines

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Four indigenous peoples of northern Philippines, the Ibalois, Bagos, Tingguians and Iyattukas consider rootcrops as staple food in the olden times. With the changing lifestyles of the younger generation of indigenous peoples, this study documented indigenous root and tuber resources and measured loss of knowledge. Secondary data gathering, interview-workshops, field visits, validation workshop and administered knowledge tests were done.
More than twenty roots and tubers consisting of ten cultivated species and more than ten wild species were identified by indigenous peoples in northern Philippines. The roots and tubers planted are cassava, sweetpotato, greater yam, taro, tannia, lesser yam, arrowroot, potato, yacon and yambean. Wild roots and tubers include nami, elephant yam, giant taro, canna, wild yam bean and wild species of taro, greater yam and lesser yam known only in their local names.
Loss of traditional roots and tubers knowledge is a reality for those born after the eighties (15-35 years). Mean test scores ranging from 37-64% translates to an annual loss of 2-3% among the younger age Bagos and Tingguians and a 1% annual loss for the Ibalois and Iyattukas. There is no loss or little loss of knowledge for those born before the eighties (36-56 years). Only a one percent annual loss is shown among the middle age Bagos, Iyattukas and Tingguians but not among the

Ibalois which had an annual one percent increase in TRK knowledge. Loss of knowledge pertains to the diversity, local names of roots and tubers and growing landscapes.

Keywords: roots and tubers, indigenours peoples, transfer of knowledge

P-17 Indigenous Knowledge and Production of Roots and Tubers among Kalanguya Tribes of Nueva Vizcaya,northern Philippines

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The Kalanguya indigenous people are long-time consumers of roots and tubers especially sweetpotato. Baseline documentation on roots and tubers grown including their indigenous knowledge on the production of these roots and tubers was established through group interview workshop and secondary data gathering.

The Kalanguyas' knowledge on root and tuber crops diversity includes eight cultivated species: namely, greater yam, lesser yam, yacon, taro, tannia, sweetpotato, cassava, arrowroot, and two wild species of taro and yam. Sweetpotato is widely grown with 31 varieties, five varieties of taro, four varieties of greater yam and two each for lesser yam, tannia, yacon and cassava.

Small areas or only a few hills (25-2400 hills) of roots and tubers are planted or maintained per household per year. Four land use patterns are being planted for root and tuber crops, i.e., the homegarden, the swidden field, the rainfed sloping field, and the garden which are distinguished according to location and crops planted. Planting materials are taken from old existing crops. Land preparation to harvesting is done manually. No inorganic fertilization and spraying of chemicals are being done, except the adoption of weedicide application to control weed growth.

Root and tuber crops production among the Kalanguyas is a source of cash income, for food and feed security and planting materials, and for them to maximize the use of limited arable mountain slopes and family labor.

Keywords: Roots and Tubers, I ndigenous Knowledge, Production, Kalanguya Tribe

P-18 Comparison of Egyptian Maize Cultivars on Effects of Salt Treatments on Growth, Yield and Mineral Components

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The salinization has been expanded in arid and semi-arid area, and common crops are damaged heavily under saline condition. Egypt is one of the countries suffering from salt damage on main crops such as maize. To solve this problem, breeding salt-tolerant cultivars is necessary. The objective of this study is to clear the effects of salt treatment to Egyptian maize cultivars on growth, yield and mineral components.

Three Egyptian maize cultivars (Three Ways Cross 321(TWC321), Three Ways Cross 324(TWC324) and SC10) and one Japanese cultivar(DKC 61-24) were cultivated in 1/2000 Wagner pots with sand and with Hoagland solution for 37 DAS(days after sowing). Hoagland solution with NaCl (0, 2000, 4000, 6000 ppm) was added once a week from 38 to 115 DAS. Photosynthetic rates and SPAD were measured on 74-75 DAS. Plants were harvested on 126 DAS, and dry weights of each parts, yield and mineral components were determined.

As a result, the plant lengths of DKC 61-24 under 6000 ppm NaCl treatment were lower than those of Egyptian cultivars. SC10 and TWC324 showed decreases of photosynthetic rates under 6000 ppm NaCl treatment. However, SC10 has kept its total biomass at high level under saline condition compared to other cultivars. Na^+ concentration of leaves and roots of SC10 under 6000 ppm NaCl showed the lowest. K^+-Na^+ ratio of roots of SC10 was the highest, and the lowest on DKC61-24 under 6000 ppm NaCl treatment. It was estimated that SC10 is the most salt tolerant among the tested cultivars.

Keywords: K+-Na+ ratio, Photosynthesis, Salt tolerance

P-19 Entomopathogenic Nematodes Exploration and Potential Test as Practical, Effective, and Environmentally Friendly Termites (coptotermes Spp. and Cryptotermes Spp.) Biological Control Agents

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Termites are destructive pests of buildings and plants which have become so severe. Caused great damage not only experienced by farmer community, but also the owners of the property. The use of synthetic termiticide has negative impacts such as environmental pollution, pesticide residues and death of some natural enemies. Furthermore, biological control is tend to be necessary nowadays to create a collaboration in sustainable agriculture and to create the environmentally-based pest management. These efforts made by looking for the potential of organisms derived from the environment. This study aims to explore the EPN (entomopathogenic nematode) species for effective pest control. Research methods include; exploration, efficacy pathogenic test, identification and mass breeding of EPN. The EPN *Steinernema* spp. was obtained from CIFOR and the EPN *Heterorhabditis* spp. was obtained from PR (Pelabuhan Ratu) soil sample. Afterwards, the EPN was breeded in two methods: *in vivo* and *in vitro.* Thereafter the treatments tested were three levels of IJ concentration, 500, 600,700 IJs/ml for *Coptotermes* spp. And 1250, 1500, 1750 IJs/ml for *Cryptotermes* spp. compared with untreated control. Percentage of mortality was assessed at 1,2,3,4,5,6,7 days after IJ infestation. The results obtained in this study are *Heterorhabditis* spp. PR sample was the most effective to control *Cryptotermes* spp. (99,34%) on the concentration 1250 IJs/ml and also was the most effective to control *Coptotermes* spp. (97,34%) on the concentration 500 IJs/ml. This result indicated that the *Heterorhabditis* spp. is more effective to control drywood and subterranean termites because of their cruising (searching) behavior.

Keywords: Entomopathogenic nematodes, Efficacy, Termites, Biological control, Biopesticide

P-20 Contribution of Nutrient Derived From Seawater to Sugarcane by Using Stable Sulfur Isotopic Method

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Salts derived from seawater fly into the land especially on typhoon or monsoon season. Excess sea water supply can cause serious damages to crops. On the one hand, this salts derived from seawater can bring essential nutrients for plants such as Ca, Mg, K, and S in sea water into filed.
This study focuses on contribution rate of nutrients derived from sea water to sugarcane by using stable sulfur isotope rate of plant and relative rate to Na of soil. Soil and sugarcane samples were collected from sugarcane field on northern and southern parts of Okinawa.
The contribution rate of soil is nearly 60% maximum, and the contribution rate of plant is 50% maximum. Moreover the contribution rate, relationship between contribution rate of seawater in soil and distance from coastline indicates negative. And the relationship between contribution rate of seawater in sugarcanes and distance from coastline indicates negative, too. There is only a low correlation between distance from coastline and relationships nutrient in soil and plant from seawater, but in the area within 1 Km from coastline, the contribution rate is especially law.
So, from examining the findings, contribution rate of salt derived from seawater is changed by distance from coastline. But it is possible that the contribution rate of salt derived from seawater to land has other factor, for example, rain fall, city area, mountain zone and typhoons.

P-21 Correlating Soil Physical Properties With The Yield of Dry-seeded and Transplanted Rice in Ecologically- Intensified Rice-based Cropping Systems

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The ecologically-intensified rice-based system aims to attain high yields yet protect soil and water resources and improve nutrient use efficiency. With improved management, dry season crops may use stored water and nutrients after rice and this might correlate with soil properties. Thus, the selected soil physical properties and rice yield for three rice-based systems were studied in unreplicated 4-ha plots which included rice-rice on puddled soil and rice-mungbean-rice and maize-rice-rice on non-puddled soils. Soil water, saturated hydraulic conductivity (K_{sat}), penetration resistance (PR), mean weight diameter (MWD), water holding capacity (WHC), and effective depth were measured. In rice-rice system, PR at 0-0.15 m layer was positively associated with K_{sat}, and negatively with effective depth and yield of transplanted rice. In rice-mungbean-rice system,

K_{sat} was negatively correlated with soil water and yield of dry-seeded rice after mungbean. WHC correlated positively with rice yields. Dry-seeded rice yielded higher than transplanted rice that consequently resulted to higher system productivity of rice-mungbean-rice (15.7 Mg ha^{-1}) than maize-rice-rice (11.9 Mg ha^{-1}) and rice-rice (10.1 Mg ha^{-1}). Low yield of transplanted rice was attributed to insufficient plant population and reflects the need for further refinements in mechanical transplanting to achieve high yields.

Keywords: dry-seeded rice, spatial variation, ecological intensification, puddled soil, non-puddled soil

P-22 PRA on Emergency Measure for Agricultural Damage by Cyclone in Hatiya Island, Bangladesh

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The Hatiya island is located in the HRA(High Risk Area) of cyclone damage in the costal area of Bangladesh, where several big cyclones have attacked and cause serious human and material damage, for example, 500,000 people death in 1970 and 140,000 people death in 1991. The human damage has been, accordingly, paid much attention for cyclone disaster mitigation program. The agricultural damage, however, has been paid comparatively less attention. The authors, therefore, have conducted the PRA(Participatory Rural Appraisal) for 3 days' field work and 1 da's local farmers' participating workshop from Dec.1st to 4 th, 2014 to learn the experiences of the local farmers how to mmitigate the crop damage from cyclone as " treatment in emergencies". The cropping patterns of the Hatiya island are much different between inside and outside of embankment. The rice variety and the crops having salinity tolerance such as Rajashail for Aman rice in rainy season and Methi (Trigonella foenum-graecum L.) or Tishi (Linum ustiatissimum L.) in dry season are cultivated in the fields ouside embankment, but Broadcating Aus rice and Transplanting Aman rice in rainy season ad peanut or grass pea, etc in dry season are cultivated inside embankment. The harvest season of Rajashail is mostly the same period of the one of two peaks of cyclone attacking. However, the local farmers do not stop the cultivation of this variety because of its agronomic characteristics well adapted to the practice of Dhane Bhashi Dewa or forcible lodging paractice, etc.

Keywords: Cyclone, PRA, Hatiya, Bangladesh, Rural Development

P-23 Effects of Bacteria Isolated From Anaerobically Digested Dairy Slurry on Fusarium

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Anaerobically digested slurry (ADS) produced under anaerobic condition contains some nutrition for plant growth, so it can be used as a liquid fertilizer. Furthermore it is revealed that ADS has some effective bacteria for plant disease. In this study, effects of bacteria isolated from anaerobically digested dairy slurry (ADDS) on *Fusarium* in medium and soil were evaluated.

First, nine-kinds of bacteria (CM1~CM9) were isolated from ADDS. These isolates were identified using BIOLOG identifying system. The inhibitory effect of each isolates on two kinds of *Fusarium* species including *F.graminearum(g)* and *F.oxysporum(Fo)* was tested by confronting-incubation. As a result, four kinds of isolates suppressed both pathogens.

Second, choosing effective isolate CM3 and evaluating the effects on the population of *(Fo) f.sp spiniciae* and the incidence of wilt in the infested soil were tested. The bud cell suspension (1.0×10^5budcells/g dry soil) was mixed into the soil and incubated. Two weeks later, CM3 suspension (1.0×10^5, 10^6,10^7cfu/g dry soil) was mixed and incubated another two weeks. After pre-treatment spinach seeds were sowed and cultivated in the incubator. 35days after sowing, the pathogenic population in the soil was not significantly different regardless of inoculation of CM3. On the other hand, the plant weight grown in the soil inoculated CM3 (10^5and10^6) and non-infested were significantly greater than that in the infested soil. This result implied that CM3 could not decrease the population of pathogens, however, CM3 could induce resistance against *F.oxysporum* to plants.

P-24 Influence of N Application Rates on Soil Chemical and Biological Composition at Two Agro-ecological Zones in Ghana

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In Ghana, many farmers apply fertilizers at different rates due to varied reasons. Thus, soil condition will be influence differently over time in respective agro-ecological environments. This study was conducted to examine how fertilizer applications rates impact soil chemical and biological activities in two different agro-ecological zones of Ghana.
Method: Soil samples were collected from 6 farms each at Guinea savannah (GSZ) (Ferric Acrisols/Ferric Lixisols) (FAO, 1998) and moist deciduous zone (MDZ) (forest ochrosols) (Adjei-Gyapong and Asiamah, 2002) agro-ecological zones of Ghana on March, 2015. The following soil analyses were conducted: NO_3^--N & NH_4^+- N, TN, microbial biomass C & N (MBC & MBN), potential mineralizable N (PMN), active carbon (ACC), extractable C & N (Extr C and Extr N), soil bacteria community structure (diversity, richness & evenness).
Results: Soil chemical and biological indicators were higher in MDZ compared to GSZ. The greatest MBC (1010 mg kg^{-1}) was found in Akroso and the lowest was Zugu (449 mg kg^{-1}). Kad showed the highest MBN (49 mg kg^{-1}) contents with Djan (0.5 mg kg^{-1}) being the lowest. Higher ACC contents were found at MDZ with Akro (633 mg kg^{-1}) being the highest. Ban (95 mg kg^{-1}) showed the highest PMN contents the lowest was Alaf (4 mg kg^{-1}). The highest Extr C and Extr N contents were found in Ban and Kad respectively. Soil bacterial diversity, specie richness and evenness were higher in MDZ than the GSZ. In the present study, inorganic fertilization showed good results especially in the MDZ.

Keywords: biological activity, chemical activity, microbial community, soil productivity

P-25 Genetic Improvement for Upland Rice Through Marker–assisted Selection (MAS) for Tolerance to Phosphorus Deficiency

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Phosphorus (P) deficiency is a major abiotic stress that limits plant growth and yield in upland rice production. The development of *phosphorus uptake (Pup1)* rice cultivars may be an attractive and cost effective approach to increasing rice yields where P deficiency is the major constraint. *Pup1* is a major QTL located on rice chromosome 12 which confers tolerance of P deficiency in soil. The study aimed to develop elite breeding lines for upland condition with yield higher than the current level and tolerant to P-deficient soils. A parental survey of 93 rice germplasm using *Pup1* markers such as K20-2, K29-1, K29-3, K46-1, was conducted to identify potential parents and to plan possible combinations. NSIC Rc240, NSIC Rc238, NSIC Rc222 and PSB Rc82 were identified to be the recipient parents while Vandana was selected as the donor parent. Utilizing the selected parents, four cross combinations were generated. Foreground selection using *Pup1* marker (K29-1) on the 21 day-old F1 seedlings produced from the four crosses revealed that *Pup1* gene was present. The F1 materials carrying *Pup1* gene were utilized accordingly in the generation of different elite lines such as near isogenic lines (NILs), recombinant inbred lines (RILs) and doubled haploid lines (DHLs). For the development of such lines, marker assisted selection was being employed using *Pup1* markers for foreground selection and closely linked SSR markers for background selection. To date these breeding lines are on the advanced stage and are planted in the field for performance evaluation.

Keywords: Upland rice, Phosphorus uptake (Pup1), Phosphorus deficiency, Marker-assisted selection

P-26 An Examination of forest Culture Measurement

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Japan, seventy percent of land is covered with forest, has been creating forest culture by utilization of forest products for their life and agricultural activities. Forest culture is "a way of life for sustainable forest utilization by human-beeings (JAFTA, 2001)". However industrialization has been changed Japanese life which are brought different relation between man and forest. For example, Japanses purchase fuel, fertilizer, furniture, even if material of houses brought from indutrialized products. On the other side, public functions of forest focuses on not only conservation of regional environment but also global earth level. We considered it is necessary to create modern aspects of forest culture. So the question is how existng the forest culture are? We try to examine the level of forest culture. Forest resources are able to be classified as material utilization by forest products and by-products, and environmentally utilization through publc functions such as water and soil conservation. An examination of

forest culture measurement was executed by level of 1) approach on forest, 2) participation of silvicultural activtis, 3) utilization of forest products, and 4) forest management activities movement.

Keywords: Forest culture, Forest management, Forest functions

P-27 Effects of A Wood Company on Sustainable Utilization of forest Resources

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Forest has mainly two functions.(1)woods supply and (2) public functions including watershed conservation and sediment disaster prevention. If these functions are well utilized by humanbeings, it can be regarded as forest resoures.But at the same time it is necessary to consider 'stock and flow' procedure for the sustainable utilization of forest management. The purpose of this paper to consider contents of stock and flow of the wood company.In this paper, we pick up a wood company logging and lumbering in Mori town, Hokkaido, Japan, as typical case. Total forest area in Mori town is 28,000ha an it is composed plantation of about 10,000ha and natural forests of 15,000ha. Its volume is about 3 million cubic meters and about 50% of them are *Larix lepolpis, Abies sachalinensis,* and *Cryptomeria japonica.* The stock and flow of forest resources has been dealt in terms of the volume, but level of stock and flow will be variable by each functions because at the fact that the forest have multi-function features. Forest owner and forest management body takes advatage of showing their stock of forest resources as a flow sufficiently. So it is indispensable for us to implement a sustanable utilization of forest resources. We should regarded the stock and flow procedure as covering various functions of forest.Therefore, it is signifiant to consider the contents of the stock and flow.

Keywords: sustainable utilization, forest resources, stock and flow

P-28 Roles of Municipal forests in Material Supply of Japanese Traditional Craft - Cases of 'Kabazaiku' and 'Japanese Lacquerware' -

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The number of Japanese traditional craft is about 1,200 and there are the problems as a shortage of successor, a securement of raw materials, a stagnant demand caused by Japanese lifestyle changes. The problem of securement of raw matrerials is especially important, because it causes the problem of degradation of quality of both Japanse tradtional craft and its materials, and the problem of interruption of technique traditions' material procurement abilities. It is occurred under the factor as the lack of informatin of materials' supply source, instability of its amount, and the lower income of materials raiser than other general workers.So a part of Japanese traditional craft became supported from the side of supply of raw materials by municipalities. In this study, we focus on the 'kabazaiku' and 'Japanse lacquerware', and through these cases to discuss the roles of municipal forests in material supply of Japanese traditional craft. 'Kabazaiku' is the Japanese traditional wood craft and is made in the cherry bark. There are many kinds such as a tea caddy, a small box, and a cigarette case. 'Japanese lacquerware' is also the Japanese traditional craft made in *japan*. There are many kinds such as tableware, fine furniture, musical instruents. As the current state in these two cases, their product is made by material from each municipal forests.

Keywords: municipal forests, traditional craft, Japanese lacquerware, kabazaiku

P-29 Effects of Bio-char Application on Soil Properties and Sunflower Growth

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Oilseed sunflower produces a lot of residue including stem, leaf and flower. Recently, a carbonization is known as the useful way to utilize those residual biomass because the products from carbonization (bio-char) have a potential for soil conditioner. Bio-char bears high pH and mineral content such as potassium. Thus, we tried to use bio-char from residue of sunflower plant as conditioner of acid red soil (Kunigami-mahji) which has poor nutrient for sunflower growth. The pH and electrical conductivity (EC) of soils which well mixed with bio-char at rate of 1, 3 and 5% (w/w) were measured to compare with control (0%). Sunflower seeds were sown in 1/5000a wagner pot filled with 2.5 kg of these mixed soils and chemical fertilizer. Soil pH of 5% mixture was significantly higher than control while the EC was increased with application rate of bio-char. Plant height, leaf number, total fresh weight, leaf area, leaf chlorophyll content, total dry weight and percentage of dry matter of the

treatments of 3 and 5% at 28 days after sowing were significant higher than control. No significant differences in those growth parameters between control and 1 or 3 and 5% treatments. This indicates that the effect of bio-char on sunflower growth may not only depend on soil pH and EC but also on soil physical properties. From these results, it is suggested that there is the potential in the bio-char from sunflower residue as soil conditioner.

Keywords: bio-char, sunflower, acid soil, soil conditioner, residue

P-30 Study on Biological Nitrogen Fixation Associated with Water Yam (*Dioscorea alata* L.)

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In yam (*Dioscorea* spp.) cultivation, the effect of nitrogen application is not clearly understood. The effectiveness of nitrogen application on the growth and yield of water yam (*D. alata*) varied among varieties (Shiwachi *et al.* 2015). The well growth shown water yam variety was fund under poor fertile soil condition. Such as water yam variety might be taken nitrogen from air by the δ^{15}N analysis (Takada *et al*. 2014). The aim of this study is to confirm the assumption of the source of nitrogen fixed in yam plant measured by the δ^{15}N analysis with comparatively used pumpkin (non-nitrogen fixating plant). The acetylene reduction activity (ARA) was analyzed for detecting of the symbiosis bacteria relating nitrogen fixation. The experiment was conducted in 2014 at TUA Miyako sub-tropical farm in Okinawa, Japan. A variety of water yam and pumpkin were tested on urea application (30 kg10a $^{-1}$ nitrogen) and no applied nitrogen as control. The result of the δ^{15}N value movement with growth in water yam plant was similar like previous report (Takada *et al*. 2014). The result suggested that the nitrogen in yam plant of control originated from air. Activated ARA was found in extracted organ from stem and root in control plant, and some bacteria were isolated from them. As a result of 16S rRNA genetic sequence analysis, *Agrobacterium, Enterobacter, Azospirillum* and *Bacillus* were isolated, and the nitrogen fixation bacterium was included.

Keywords: Water yam, Nitrogen fixation, δ15 N , ARA

P-31 Characterization of Artificial-polyploid Plants on White Guniea Yam (*Dioscorea rotundata* Poir.)

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White guinea yam (*Dioscorea rotundata* Poir.) is very popular and important food crops in the West Africa.Yam's hybridization is difficult because of dioecism and irregular and erratic flowering. The use of colchicine inducing polyploidization is considered as an effective method. In this study, artificial-polyploid plants of *D. rotundata* (TDr 1793, TDr 2351, TDr 2720 and TDr Unknown) were used and morphological characteristics and yield traits of colchicine-induced variants (polyploid plants) were evaluated. In leaves at 60 and 120 days after planting (DAP), guard cell lengths in polyploid plants were significantly large in all varieties and stomata densities were also significantly low in all polyploid plants. In thickness of leaves at 60 DAP, polyploid plants of TDr 1793 and TDr Unknown significantly showed thicker leaves, while other varieties did not show significant difference. Harvest investigation was conducted at 240 DAP. In TDr 2351, the aerial parts of untreated plants almost entered senescence stage with new tubers, but these of all polyploid plants were still growing and new tubers did not form on the plants. This result suggests that maturity of polyploid plant in TDr 2351 may be changed to late mature variety. In TDr Unknown, aerial parts and size of tuber of polyploidy plants was lower than control. In conclusion, artificial-polyploid plants showed different phenotype and characteristics of growth. Our results suggest that the polyploidy breeding is the useful method for yam breeding, especially for expanding diversity of yam variety.

Keywords: Colchicine, Dioscorea rotundata, Morphological variations, Polyploidy, Yield traits

P-32 Effect of Ginger Root Powder Supplementation on Growth Performances and Carcass Characteristics of Broiler Chickens as Rearing in Hot Climate

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This study was conducted to investigate the effect of dietary supplementation with ginger root powder as a natural growth promoter on performances and carcass characteristic of broiler chickens as rearing in hot climates. A total of 250 one-day-old male broiler chicks (Ross 308) were allocated to five treatments with five replicates. The dietary treatments consisted of the basal diet with no supplement as control, basal diet containg 100 mg/kg vitamin E as positive control, basal diet containg 8, 16 and 24 g/kg of ginger root powder as dietary treatment. The curcumin content of the ginger powder was 1.29 ± 0.04% by weight. Body weight gain and feed intake of chickens were not influenced by the dietary treatments. Broilers fed ginger root powder supplemented diets exhibited better feed efficiency over the entire experimental periods in comparison with control group ($P<0.05$). A significant decreased ($P<0.05$) in abdominal fat pad was observed in chickens fed the supplementation of ginger root powder. The obtained results from this study could be concluded that dietary inclusion of ginger root powder have no significant to improve broiler performance, however, it has significantly improved ($P<0.05$) feed efficiency. It was also found that supplementation with ginger root powder has significantly improved ($p<0.05$) carcass characteristic of broilers in term of reduction abdominal fat percentage.

Keywords: ginger root powder, broiler performances, carcass characteristic, hot climate

P-33 Growth of Sago Palm Seedlings under Different Soil Ph Conditions at the Experimental Farm in Kendari, Indonesia

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The sago palm is a monocotyledon plant that grows in swampy and peaty soils. $CaCO_3$ is one of the liming materials used to improve or amend the soil, which is a common solution to acidity. In this study, we analyzed the growth of sago palm seedlings grown in the native acid soil and in soil treated with calcium to increase the soil pH. The 2 plots were placed under natural sunlight at the experimental farm, Faculty of Agriculture, Halu Oleo University, Kendari, Indonesia. The 16 young sago palm seedlings were transplanted. In the native acid soil plot (control) and the calcium application plot, 3kg calcium carbonate was applied prior to the transplanting. The growth in plant height, plant length, leaflet number per leaf, dead leaf number per plant, and dry matter weight of each part for 6 months after transplanting was almost the same as in the control and calcium application plots. The difference in dry matter weight tended to be different from plant part to part. There was a significant difference in RGR and NAR between the two plots for 4 months from 6 months after transplanting. It is still unclear whether the sago palm will show a preferable growth at a lower soil pH condition. Based on the results of the current study, the experimental procedures at field level show that the growth of the sago palm will not decelerate under acidic conditions compared with that under neutral conditions in soils that have the same parent material.

Keywords: Experimental farm, Growth, Sago palm seedling, Soil pH

P-34 Use of Electrical Conductivity in Soil-specific Nitrogen Fertilizer Recommendation for Sugarcane Production

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The study was conducted to determine the potential use of soil electrical conductivity (EC) in developing soil-specific nitrogen fertilizer recommendation. Relationship of field EC with soil physico-chemical properties such as texture, CEC, pH, total N, available P and exchangeable bases including K, Ca and Mg were established. Soil samples representing the following soil orders; Andisol, Alfisol, Ultisol, Entisol, Inceptisol, and Mollisol in La Carlota Sugar Mill District, Negros Occidental, Philippines were used. Significant positive relationship was observed between field EC and soil pH, CEC, exchangeable Ca and Mg and clay content while negative correlation was noted between field EC and sand content. EC measurements in relation to other soil physico-chemical properties were used to delineate boundaries and develop different management zones presented as EC maps. This study suggests that soil-specific N fertilizer application can be managed using soil EC specifically in sugarcane production areas wherein easy and rapid soil nutrient status monitoring is needed.

Keywords: soil electrical conductivity, sugarcane production, EC maps, N fertilizer application

P-35 Isolation of Phosphate Solubilizing Microorganisms (psm) From Vegetables Rhizosphere and Its Germination Effect on Tomato (Lycopersicon Spp.)

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Phosphate is one of the most essential nutrients required for plant growth and development. In soil complex, most phosphorous supplements are rendered unavailable to plants. Advance research right now is geared toward understanding the role of microorganisms in nutrient management. This study would look at Phosphate solubilizing microorganisms (PSM) important role in plant nutrition as they render P available for plant uptake after solubilization and validate its effect on seed germination using tomato (*Lycopersicon spp.*) crops.

A total of eighteen (18) microorganisms were isolated from the rhizosphere of vegetable crops planted under organic farming management in Cagayan Valley, Philippines. Initial screenings were done using agar plate and broth assays on NBRIP medium and tested for phosphate solubilizing activity. PSM isolates were grown in culture medium for 7 days and further characterized for their solubilization index. The effect of pH change on growth of PSM culture medium was also studied.

Results showed that solubilization index of isolates ranged from 0.8215 (M2) to 2.125 (NBRIP 30). The pH dropped from 7.0 to 4.4 in 3 days and PSM isolates grew rapidly at higher pH. Ten (10) PSM inoculants were tested for seed germination effect with highest germination of 95 percent (N24), vigor index of 804.6 (SM1), and radicle length of 5.365 mm (SM1) for tomato seeds, respectively. The present study suggests the potential of several isolates as biofertilizers for crop plants.

Keywords: phosphate solubilizing microorganisms, rhizosphere, solubilization index, seed germination, vigor index

P-36 Yield Performance of NERICAs under Different Water Management Practices in Mwea, Kenya

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Producing more rice with less water is one of the major challenges for rice production in Kenya because of decreasing water availability for agriculture and increasing demand for rice. In this study, we aimed to identify differences in adaptability to different soil water conditions among rice varieties including NERICAs. On-station field experiments were carried out in Mwea, Kenya for 2 seasons from Oct. 2013 to Feb. 2015. In the first season, growth and yield responses of 50 lowland and upland varieties including NERICAs were evaluated under continuously flooded (FL), alternate wetting and drying (AWD), irrigated upland (IRU), and rainfed upland (RFU) conditions. In the second season, varietal differences among NERICAs were analyzed. In the first season, average panicle weight of the lowland varieties was decreased by 18% under AWD and 24% under IRU compared to that under FL, while that of upland varieties including NERICAs were increased by 17% under AWD and 8% under IRU. This indicates that upland varieties have greater adaptability to AWD and IRU. In the second season, there were varietal differences in adaptability to AWD and IRU among NERICAs. Relative grain yield of NERICAs with FL being 100% ranged from 71 to 112% under AWD and from 58 to 144% under IRU. Cluster analysis classified NERICAs into 4 groups; adapted-to-AWD, adapted-to-IRU, adapted-to-AWD and IRU, and non-adapted. NERICAs had a larger sink size under AWD and IRU than that under FL. The filled-grain ratio tended to be higher in the groups adapted to AWD and IRU than in the non-adapted group.

Keywords: Rice, NERICA, Water management practices, Yield and yield components, Kenya

P-37 Simultaneous Multiplex RT-PCR Detection of Papaya-infecting Potyvirus Species

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A multiplex reverse-transcription polymerase chain reaction (RT-PCR) system was developed for simultaneous detection of potyviruses in naturally infected papaya crops from the Indonesia Province of South and West Sulawesi. A total nucleic acid extracts of the naturally infected crop were used to reverse transcription (RT) using oligo dT primer. Multiplex PCR using a mixture of three primer sets specific to WMV, ZYMV and PRSV was capable of amplifying viral genes. Three potyviruses were accurately detected by singly, doubly and triply infected with those viruses as well as mixtures of viral RNA.

Keywords: Simultaneous Multiplex RT-PCR, papaya, potyviruses

P-38 Effects of Sri Methods on Growth and Yield of Rice in Mwea, Kenya

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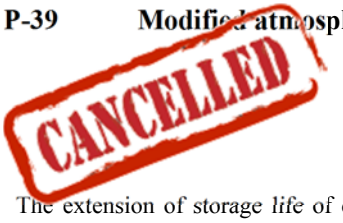
System of Rice Intensification (SRI) is promoted in Kenya for increasing rice production in recent years. SRI is a combination of 5 methods consisted of intermittent irrigation, nursling seedling, wide plant density, single planting and application of organic fertilizer. To evaluate the contribution of each SRI method to the high yielding, we conducted a field experiment in Mwea, Kenya. In the experiment, we prepared 8 treatments including SRI, control, farmer's practice and 5 partial-SRI. SRI consisted of Intermittent Irrigation (II), 12-Days-Seedling (12DS), Wide Plant Density (WPD), 1 Plant per Hill (1PH) and applying Organic Fertilizer (OF). Control consisted of Continuous Flooded (CF), 21-Days-Seedling (21DS), Narrow Plant Density (NPD), 3 Plants per Hill (3PH) and nothing but Chemical Fertilizer (Ch.F). In each partial-SRI, one of the SRI methods was replaced with a corresponding control method. The highest total dry matter weight at harvest was obtained in SRI without II (CF, 12DS, WPD, 1PH and OF), which was 119 % of the control. Although accurate yield data was not available because of the outbreak of rice-blast disease after heading, effect of SRI methods on some yield components was analyzed. SRI without II achieved the highest grain number per square-meter. 12DS and OF increased panicle number per square-meter and grain number per panicle, respectively. By contrast, II decreased panicle number per square-meter and grain number per panicle, while WPD decreased panicle number per square-meter. In conclusion, SRI may increase the yield of rice in Kenya. However yield decrease caused by II need to be addressed.

Keywords: rice, SRI, intermittent irrigation, nursling seedling, Kenya

P-39 Modified atmosphere Packaging Extends Storage Life of Dragon Fruit Hylocereus Polyrhizus (weber) Britton & Rose]



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The extension of storage life of dragon fruit was determined through modified atmosphere packaging (MAP). Fruits were packed in polyethylene bag with 2 perforations (PE2pf), polyethylene bag with 18 diffusion holes (PE18dh), antifog PEB film with 2 perforations (AF2pf), antifog PEB film with 18 diffusion holes (AF18dh) and cling wrap (CW). Fruits packed in MAP significantly maintained high visual quality rating, delayed peel shriveling and change in bract color. Fruit softening and weight loss were reduced also by MAP. At 12-14°C storage, fruits packed in PE2pf had extended postharvest life for 25 days due to delayed peel shriveling and change in bract color. Fruit had a maximum of 22 days storage life at 12-14°C and three (3) days shelf life at 20°C. Moreover, PE2-packed fruits had significantly higher total phenolic content and antioxidant activity than the non-MAP fruits.

Keywords: red-fleshed dragon fruit, polyethylene bag, antifog film, storage life

P-40 Genetic Variation of Milkfish (Chanos chanos) Broodstock and Hatchery-produced Fingerlings and Juveniles in the Philippines

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T he milkfish (*Chanos chanos*) is an important food fish and is widely farmed in the Philippines, Indonesia, and Taiwan. Owing to the seasonality of fry from natural spawning grounds, fish farmers are now relying heavily on hatchery-produced fry. In this study, fin clips from broodstock and muscle tissues from juvenile fish or fingerlings were collected from five government-run, one hatchery run by an intergovernmental agency, and four private hatcheries in the Philippines. For comparison, milkfish grown from fry imported from Indonesia were also included. The full-length sequence of cytochrome b (1,141 bp) and the 3' peripheral domain of control region (472 bp) were obtained from 45 to 50 specimens from each population. Milkfish from SEAFDEC-Iloilo had the highest nucleotide diversity (π=1.45%), followed by milkfish from Retcem Hatchery (1.38%), Feedmix Hatchery (1.35%), CDO Aquafarm (1.25%), Indonesia (1.24%), BFAR-Palawan (1.21%), BFAR-Dagupan (1.14%), BFAR-Albay (1.09%), BFAR-Bohol (1.02%), BFAR-Camiguin (0.94%), and Oversea Hatchery (0.91%). In terms of haplotype diversity, SEAFDEC-Iloilo and BFAR-Palawan had the highest value at 0.996, while Oversea Hatchery, BFAR-Albay and BFAR-Bohol had the lowest at 0.896, 0.873, and 0.820, respectively. Although these genetic diversity values can be considered high, those obtained for milkfish from BFAR-Albay, BFAR-Bohol, BFAR-Camigiuin, and Oversea Hatchery were consistently lower than those from the other hatcheries. These data can be used by hatchery operators to look into their broodstock management practices to ensure that the genetic quality of their broodstock do not deteriorate further and to consider using stocks with high genetic variability as replacement for old breeders.

Keywords: Broodstock, Genetic Variation, Hatchery, Milkfish, Population Genetics

P-41 Shape Differences in Five Strains of Genetically Improved Nile Tilapia (Oreochromis niloticus) Using Geometric Morphometrics

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Determination of fish stock structure is important in developing optimal strategies for efficient management aquaculture species. Morphometric analysis provides a robust, non-expensive, and statistically powerful means of stock delineation. In this study, geometric morphometrics was used to determine shape differences in five strains of genetically improved Nile Tilapia (*Oreochromis niloticus)*. The strains were as follows: (1) Genetically Improved Farmed Tilapia (GIFT), the product of the first selective breeding program for tropical fish; (2) Freshwater Aquaculture Center-selected tilapia (FaST), the product of the combination of four *O. niloticus* strains from Taiwan, Thailand, Israel and Singapore; (3) GET-EXCEL, a cross between GIFT and FaST; (4) GIFT Malaysia, established based on the sixth generation of GIFT from the Philippines; and (5) SEAFDEC whose founding population was the Chitralda strain. Images of 263 individuals at four months old were taken, unto which 17 landmarks were digitized. Principal Components Analysis (PCA) revealed significant shape differences between strains. The Canonical Variate Analysis (CVA) plot showed the SEAFDEC strain to be most unique in shape whereas close similarity was observed among specimens of GIFT Philippines, GIFT Malaysia and GET-EXCEL. Discriminant groupings by CVA reflect the historical relationships among the strains. Morphological traits such as the tip of the snout, insertion of the pelvic fin, ventral base of the caudal fin, and the anterior end of the dorsal fin can be used to differentiate one strain from the other. Sexual dimorphism in shape was also evident.

Keywords: Geometric Morphometrics, Oreochromis niloticus, Genetic improvement

P-42 Diffusion of 'Community Forestry' and 'Paddy Agroforestry' among Swiddeners in the Bago Mountains of Myanmar

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According to the Forest Department of Myanmar, 1.5 to 2 million rural dwellers are either directly or indirectly involved in swidden agriculture, affecting 20 million ha in the country. Thus far, however, land use rights of those swiddeners have received little formal recognition. The Forest Department issued Community Forestry Instructions (CFI) to promote community participation in environmental conservation and forestry activities in 1995. Recently, Myanmar's reintegration into the world has prompted changes in the state land management system. The Farmland Law (FL) and Vacant, Fallow and Virgin Lands Management Law were approved by Parliament in 2012. The 2012 FL established a system of land registration for farmers that ostensibly provides land use certificates. In the draft National Land Use Policy released in 2014, ethnic nationalities' land use

rights are addressed. This land use policy will form the basis for the country's first Land Law, which is still at a preparatory stage. With this background, this village-level case study provides examples of consequences of the changes in the state land management. In the study village in the Bago Mountains of Myanmar, some swiddeners, partially informed about the new state land management system, began to establish 'community forestry' and/or 'paddy agroforestry,' expecting land tenure security in the near future. Existing CFI and FL are used as a key to land tenure security and this perspective became a main driver of recent diffusion of 'community forestry' and 'paddy agroforestry' among swiddeners in the Bago Mountains of Myanmar.

Keywords: Community Forestry, Paddy Agroforestry, swidden agriculture, land tenure security, Myanmar

P-43 Proteomic Analysis of Milk Protein Component and Concentration Based on SDS-PAGE to Detect Powdered Milk in Raw Cow Milk

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Milk is high nutritional value foodstuffs and they are often subjected to adulterations. The addition of powdered derivatives is difficult to detect because the adulterant materials have almost the same component of raw milk. However, the high temperatures used for milk powder production could indicate of some modified proteins and it could be used as markers for the presence of powdered milk. In this work, raw milk and the addition of powdered derivatives such as whole milk, cream powder and whey powder were subjected to SDS-PAGE. Protein profile gels show that raw milk addition of whole milk powder and cream powder in greater levels. Intensity protein bands of high molecular weight complex as immunoglobulins (~83 kDa), lactoferrin (~75 kDa), serum albumin (~69 kDa) and casein (~37, 33, 31 and 25 kDa) are similar with raw milk. Intensity protein bands of low molecular weight complex as ß-lactoglobulin (~18 kDa) and α-lactalbumin (~12kDa) decrease while compared to raw milk and the addition of whey powder in greater levels. Intensity protein bands of high molecular weight complex as immunoglobulins (~84 kDa), lactoferrin (~77 kDa), serum albumin (~67 kDa) and casein (~37, 33, 30 and 26 kDa) are decrease while compared to raw milk. Intensity protein bands of low molecular weight complex as ß-lactalbumin (~18 kDa) and α-lactoglobulin (~13 kDa) increase while compared to raw milk. Finally, analyses were carried out with the fast procedure on raw milk samples adulterated with powdered milk at different ratio, and diagnostic protein were detected down to 25% of adulteration level.

Keywords: adulteration, powdered milk, raw cow milk, SDS-PAGE, proteomic

P-44 Involvement of Secondary Metabolites Relevant to Blast Disease Resistance of Rice

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The production of phenolic compounds after inoculation of blast fungus *Pyricularia grisea* was studied in fifteen rice varieties that was grown and evaluated the resistant capacity. Total phenolic and flavonoid contents reduced after infection of blast disease. It is deduced that the blast fungus can affect rice growth through weakening secondary metabolites of phenols and flavonoids. There are 11 phenolic compounds were detected and quantified in rice leaves. The concentration of some phenolic compounds was significant change after infection of blast pathogen. There were strong relations between accumulation of phenolic compounds and blast resistant capacity of rice. Among detected phenolic acids, *p*-hydroxybenzoic acid, ferulic acid and catechol may be important to the resistance against blast fungus of rice.

Keywords: phenolic, rice, blast disease, fungus, secondary metabolite

P-45 DNA Barcoding of Feral Tilapias in Philippine Lakes

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Tilapia (*Oreochromis mossambicus*) was first introduced to the Philippines in 1950 for aquaculture. Since then, other species of tilapia have been introduced to the country and some of them (mainly *Oreochromis niloticus*) have become established in lakes, rivers, and other bodies of water. In this study, DNA barcoding using the mitochondrial cytochrome *c* oxidase subunit I (COI) gene was done to assess the reliability of morphological identification and the degree of introgression among feral

tilapias (*Oreochromis* spp.) in seven major Philippine lakes, namely: Laguna de Bay, Lake Lanao, Taal Lake, Lake Mainit, Lake Naujan, Lake Bato, and Lake Buhi. Specimens were also collected from a private hatchery in Sual, Pangasinan to serve as reference. Morphological traits, Nucleotide BLAST (BLASTn), and Translated BLAST (BLASTx) analyses were used to classify the specimens. A Neighbor-Joining tree was constructed using the Kimura 2-Parameter method, incorporating 66 COI sequences generated from the study and 20 additional reference sequences obtained from GenBank. Three Oreochromis clusters were obtained and were classified as the O. niloticus group, O. mossambicus group, and O. aureus group, with bootstrap support values of 99%, 74%, and 99%, respectively. The mean K2P genetic distances within each group were 0.008%, 0.959%, and 0.086%, respectively. The clustering of COI sequences generated from this study corresponded with the results of the BLASTn analysis. Moreover, *Oreochromis* hybrids were found in all of the lakes. The study highlights the usefulness of DNA barcoding for molecular identification and detection of introgressed individuals, with potential applications in management of wild stocks such as *Oreochromis*. Liwasan

Keywords: Cichlid, CO1, TILAPIA, DNA BARCODING, PHILIPPINE LAKES

P-46 RAPD Analysis in Wild and Hatchery-bred Milkfish Juveniles (Chanos chanos forsskål)

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Milkfish (*Chanos chanos* Forsskål) is the leading fish in Philippine aquaculture. Randomly amplified polymorphic DNA (RAPD) was used to study for genetic variation among wild and hatchery-bred populations in the Philippines and Indonesia. Fin clips and/or muscle tissues were extracted from four hatchery-bred (Albay, Bohol, Camiguin, and Iloilo) and three wild (Antique, Camarines Sur, and Camiguin) juvenile populations in the Philippines as well as one hatchery-bred (Bali) and two wild (Medan, Sulawesi) populations from Indonesia. From 60 oligonucleotide primers, 10 primers were selected for RAPD analysis. PyElph software (version 1.4) was used for band scoring, matching, and molecular weight computation. Statistical analysis was done using POPGENE software (version 1.32). Preliminary results using five primers revealed 118 polymorphic bands. From the Philippine populations, wild milkfish from Camiguin had the highest percentage of polymorphic loci (69.75%) followed by Iloilo (59.66%), Camiguin-Hatchery (57.14%), Albay (53.78%), Camarines Sur (52.94%), Antique (48.74%), and Bohol (46.22%). Indonesian samples exhibited high degrees of polymorphism as follows: Sulawesi (68.91%), Medan (63.03%), and Bali (61.34%). UPGMA dendrogram based on genetic distance revealed one main cluster, with sub-clusters of populations based on geographical proximity. No segregation was observed between wild and hatchery-bred populations.

Keywords: milkfish, polymorphism, wild, hatchery, population genetics

P-47 Evaluation for Cooked Rice Properties of an Eating-quality Qtl in *Oryza sativa* L. Cv. Koshihikari

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Recently, the major quantitative trait loci (QTL) for eating quality were detected on the short arm of chromosome 3 in *Oryza sativa* L. cv. Koshihikari. In this study, we used substitution lines (SLs) with *Oryza sativa* L. cv. Nipponbare segments in the QTL region in the Koshihikari genetic background to investigate relationships among eating quality, grain shape, texture and structure.
In 2013, we cultivated these five SLs (SL-1~5) with different substitution fragments, Koshihikari and Nipponbare at Tsukuba, Ibaraki Prefecture and harvested them at ripening stage. Eating quality of cooked rice was evaluated by sensory test. We measured grain shape of unpolished rice, grain texture of cooked rice by Tensipressor, and section observation of the torn surface of cooked rice by iodine staining.
In the sensory test, SLs showed lower points than Koshihikari. In SLs, SL-2 showed lowest point. In the shape measurement of unpolished rice, SL-2 are smaller size than other SLs, and the grain shape of SL-2 was close to Nipponbare. In texture, SL-2 showed lowest adhesiveness value in samples. In the section observation, leached starch was observed on the outer layer of cooked rice grain in Koshihikari, but not observed in SL-2 and Nipponbare. Adhesiveness would be associated with amount of leached starch. From these results, we suggested that the QTL region for eating quality affected grain shape of unpolished rice and grain texture of cooked rice.

Keywords: Oryza sativa L., metabolome analysis, gas chromatography-mass spectrometry, Low-molecular compound

P-48 Characteristics of Fermented Wheat Starch and Application in Processed Foods

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The food industry has greatly developed with advances in processing technology; however the large amount of industrial waste has become a problem. Effective utilization of waste and unused resources is needed. One of the unused resources is wheat starch (WS), a by-product of the gluten manufacturing process. In Japan, WS is utilized as a material for Kuzu-mochi after fermentation. Kuzu-mochi, which is a traditional Japanese sweets from the Edo period, has a unique gelatinous texture and good mouthfeel. These characteristics may be attributed to fermented wheat starch (FWS). Thus, we examined the characteristics of fermented wheat starch and its possible effective utilization.

WS and FWS were evaluated for their pasting properties by rapid visco analyzer (RVA). FWS had a low final viscosity and setback, whereas WS had high final viscosity and setback. The gel strength of FWS and WS heated with a RVA was measured by a texture analyzer. FWS formed a softer gel than WS. The hardness of FWS after 24 and 72 hours increased by 10% and 20%, while that of WS after 24 and 72 hours increased by 20% and 30%. It was suggested that resistance of retrograded starch was improved by fermentation. A sensory test of milk pudding with FWS or WS and corn starch was carried out. The pudding with FWS had a smooth and soft palate feeling, but the texture of the pudding with WS was harder.

Keywords: Fermentation, Wheat starch, Kuzu-mochi, Pasting property, Gel strength

P-49 Japanese Cooked Rice Metabolome Analysis by Gas Chromatography-mass Spectrometry

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In this study, we performed metabolomic analysis of Japanese cooked rice using gas chromatography-mass spectrometry and examined the differences in the low molecular weight compounds contained in the raw rice, and the external solution and grain of cooked rice.

Extracted of these samples using aqueous methanol were used for our study. After trimethylsilyl-oxime derivatization, the samples were subjected to gas chromatography-mass spectrometry (Agilent Technologies, Inc.). We used MetAlign (Lommen, 2009) to process the MS spectra and generated chromatograms. Data were analyzed using AIoutput 2 (Platform for RIKEN Metabolomics) the 561 compound library (GL Sciences Inc.). The chemometric analysis was performed using Pirouette software (GL Sciences Inc.).

The cooked rice fractions were composed of sugars such as glucose, sucrose, fructose, galactose, and xylose, and galacturonic acid. The major amino acids included glutamic acid, aspartic acid, glycine, isoleucine, leucine, tyrosine, and N-carbamoyl-L-aspartate. The observed organic acids included ferulic acid, fumaric acid, shikimic acid, and malic acid. Approximately 45 compounds were identified. This was suggested that difference in the samples might have been because of the difference in the amount and ratio of the low molecular weight compounds.

Next, we were analyzed the difference in the taste of the cooked rice. The results of the Partial Last Squares Regression analysis suggested that the proportion of compounds in each cooked rice sample was different, indicating a possibility of predicting the taste of cooked rice based on the presence of the proportion of the different compounds.

Keywords: Japanese cooked rice, metabolome analysis, gas chromatography-mass spectrometry, Low-molecular compound, taste

P-50 Field Survey of Roselle (*Hibiscus sabdariffa* L.) and Kenaf (*Hibiscus cannabinus* L.) in Myanmar, 2015

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Myanmar has been suggested to harbor genetic diversity of rice and several other cultivated plants. However, systematic field survey of local vegetable genetic resources in a home garden at a farmhouse in Myanmar was not so intensively organized so far in Myanmar.

Therefore the field investigation and collections for local vegetable genetic resources in a home garden were carried in cooperation with Yezin Agriculture University and Department of Agriculture in Myanmar. This time, we focused mainly the genetic diversity of Roselle (*Hibiscus sabdariffa* L.) and Kenaf (*Hibiscus cannabinus* L.) which are generally used as local vegetables in Myanmar.

We visited to the farmhouse and the markets of 22 townships in Yangon division, Bago division, Mandalay division and Shan state from August 22 to September 17, 2015. 56 farmers were interviewed regarding the usage and cultivation system of these

plants and 22 seed (Roselle 16, Kenaf 6) and 61 herbarium samples of Roselle and Kenaf were collected from the surveyed sites.

Based on foliar morphology (thickness and depth of the lobes), type of grass (upright/branched) and stem color (red/green/speckled), the samples were classified as five types of Roselles and four types of Kenafs. Moreover, we also found out that the four types of Malvaceae are used for various usage in Myanmar and these are collectively known in Burmese as "Chin-bao". This research indicates that the great diversity of Roselle and Kenaf can be inferred from several factors such as political factors (national isolation policy), ethnic factors (135 minority ethnic groups) and environmental factors (dry regions/mountain regions/humid regions).

P-51 Evaluation of Potato Entries for Its Chipping Quality

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Forty five potato entries harvested in Atok, Benguet Philippines were evaluated for chipping quality. The parameters taken includes: dry matter content, chip recovery and sensory characteristics as basis for selection and recommendation. This was done at the Northern Philippines Root Crops Research and Training Center (NPRCRTC) processing laboratory in 2014.

Among the forty five entries evaluated, twenty two entries including Igorota satisfy the dry matter content requirement of 22 to 24% for potato chips. As regards to chip recovery, the minimum requirement of at least 20% has been exceeded by all new potato entries including the check variety. The chip recovery is indeed good which means gainful for chips processing.

All the potato chips were crispy. Potato entries with no browning to slight browning and slightly oily chips are the ones rated acceptable. The acceptable eighteen new entries are: 30055.32, 388615.22, 391180.6, 395434.1, 397069.5, 391402.5, 392781.1, 393595.1, 395192.1, 398098.203, 398098.231, 398160.105, 398180.289, 398192.213, 398192.41, 398193.135, 398193.167, 398193.84 and check var. Igorota. Potato entries that are oily and moderate to excessive browning chips were rated unacceptable by the panelist.

A total of eighteen (18) new potato entries are recommended for processing of potato chips. These 18 potato entries can also be recommended for potato fries because the characteristics and requirements for fries are similar to potato chips.

Keywords: Chips, Potato, Evaluation, Processing

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